

LOG of BORING No. B-1

Sheet 1 of 3

DATE 10/10/14 SURFACE ELEVATION 32.6 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Asphalt Pavement (approx. 3" to 6") and Coarse Aggregate	31.6					
			AU	Subgrade (approx. 6")						
			AU							
5			AU	Brown silty coarse to fine SAND and coarse to fine GRAVEL, with cobble to boulder sized debris (concrete)	27.1					
				(Fill)						
			AU							
		15	SS	Firm to stiff gray fine sandy clayey SILT		4.5				
10		6	SS			1.3-2.8				
		12	SS			1.3-1.8				
15		6	SS	(Fine Grained Alluvial Soil)	17.1	2.0-2.8				
		8	SS	Medium dense to dense gray to brown silty fine SAND trace clay						
		6	SS	(Coarse Grained Alluvial Soil)	13.6	2.0				
20				Medium dense gray micaceous silty medium to fine SAND						
		17	SS							
25				(Residual 1 Soil)	6.1					
		30	SS	Dense to very dense gray micaceous silty medium to fine SAND						
30										
		33	SS							
35										
		37	SS							
40										
		47	SS							
				Continued on Sheet 2 of 3 (Residual 2 Soil)						

Completion Depth: 64.3 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

15/15 BORING POST SUBSTATION.GPJ

LOG of BORING No. B-1

Sheet 2 of 3

DATE 10/10/14 SURFACE ELEVATION 32.6 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to very dense gray micaceous silty medium to fine SAND						
50		31	SS	(Residual 2 Soil)	-19.0					
55		50/5"	SS	Very dense gray decomposed rock friable to silty coarse to fine SAND						
60		50/1"	SS							
65		80/9"	SS	(Decomposed Rock)	-32.5					
70			NQ							
75				END OF BORING						
80				Notes: 1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 2. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 3. Drilling resistance (i.e. rig chatter) noted at approximately 54 feet, which may be indicative of less weathered decomposed rock. 4. The borehole was backfilled with cement/bentonite grout at completion. 5. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil.						
85										

Continued on Sheet 3 of 3

Completion Depth: 64.3 ft. Water Depth: See ft., After _____ hrs.
 Project No.: 20000621 Notes ft., After _____ hrs.
 Project Name: Proposed PECO Post Substation _____ ft., After _____ hrs.
 Drilling Method: Hollow Stem Augers- Auto Hammer _____ ft., After _____ hrs.

LOG of BORING No. B-1

Sheet 3 of 3

DATE 10/10/14 SURFACE ELEVATION 32.6 LOCATION See Plate 2

DEPTH, FT. SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS									
90																		
95																		
100			<p>Notes continued:</p> <p>6. Temporary two-inch diameter PVC ground water observation well was installed to a depth of approximately 65 ft below the existing ground surface with the bottom 10 ft screened.</p> <table><tr><td><u>Date</u></td><td><u>GW Depth (ft)</u></td><td><u>GW Elev (ft)</u></td></tr><tr><td>10/21/2014</td><td>14.0</td><td>18.6 +/-</td></tr><tr><td>10/23/2014</td><td>10.0</td><td>22.6 +/-</td></tr></table>	<u>Date</u>	<u>GW Depth (ft)</u>	<u>GW Elev (ft)</u>	10/21/2014	14.0	18.6 +/-	10/23/2014	10.0	22.6 +/-						
<u>Date</u>	<u>GW Depth (ft)</u>	<u>GW Elev (ft)</u>																
10/21/2014	14.0	18.6 +/-																
10/23/2014	10.0	22.6 +/-																
105																		
110																		
115																		
120																		
125																		
130																		

Completion Depth: 64.3 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

15/15 BORING POST SUBSTATION.GPJ

LOG of BORING No. B-2

Sheet 2 of 2

DATE 10/9/14 SURFACE ELEVATION 32.1 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45										
50		31	SS	Dense to very dense gray micaceous silty coarse to fine SAND			23.1			
55		80/8"	SS	(Residual 2 Soil)	-21.9		12.5			
55				Very dense gray decomposed rock friable to silty coarse to fine SAND						
60		50/5"	SS	(Decomposed Rock)	-26.3		11.7			M
60				END OF BORING						
65				Notes: 1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 2. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 3. The borehole was backfilled with cement/bentonite grout at completion. 4. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 5. Groundwater observed at approximately 14 feet below ground surface after completion of drilling.						
70										
75										
80										
85										

Completion Depth: 58.4 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

Sheet 1 of 2

DATE 10/9/14 SURFACE ELEVATION 32.1 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Asphalt Pavement (approx. 3" to 6") and Course Aggregate	31.1					
			AU	Subgrade (approx. 6")						
			AU	Firm to stiff brown silty CLAY						
				(Fill)	28.1					
5			AU	Firm to stiff brown fine sandy SILT, trace clay						
			AU							
10		10	SS	(Fine Grained Alluvial Soil)	22.1	2.0-3.0	19.2	22	19	M
		17	SS	Medium dense to dense gray to brown silty fine SAND		0.8-1.0	21.6			
		17	SS				25.1			
15		12	SS				23.7			M
		17	SS	(Coarse Grained Alluvial Soil)	15.1		24.5			
		9	SS	Medium dense to very dense gray micaceous silty coarse to fine SAND			25.4			M
20										
		13	SS				24.0			
25										
		24	SS				36.5			M
30				(Residual 1 Soil)	0.6					
		31	SS	Dense to very dense gray micaceous silty coarse to fine SAND						
35										
		71/11"	SS				20.7			M
40										
		44	SS	Continued on Sheet 2 of 2 (Residual 2 Soil)			24.7			

Completion Depth:	58.4 ft.	Water Depth:	See	ft., After		hrs.
Project No.:	20000621		Notes	ft., After		hrs.
Project Name:	Proposed PECO Post Substation			ft., After		hrs.
Drilling Method:	Hollow Stem Augers- Auto Hammer			ft., After		hrs.

LOG of BORING No. B-3

Sheet 1 of 2

DATE 10/13/14 SURFACE ELEVATION 32.4 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Asphalt Pavement (approx. 3" to 6") Coarse Aggregate	31.4					
			AU	Subbase (approx. 6")						
			AU	Firm to stiff brown fine sandy silty CLAY with gravel (Fill)	27.9					
5			AU	Firm to stiff gray fine sandy clayey SILT / fine sandy SILT, trace clay						
			AU							
7			SS			3.0-3.8				
10			SS			3.0-4.5				
11			SS	(Fine Grained Alluvial Soil)	18.4	2.0-2.5				
15			SS	Medium dense to dense gray brown silty medium to fine SAND with varying amounts of gravel						
34			SS	(Coarse Grained Alluvial Soil)	14.4					
20			SS	Medium dense gray micaceous silty medium to fine SAND / medium to fine sandy SILT		1.0-1.3				
25			SS							
30			SS							
35			SS							
40			SS							
				(Residual 1 Soil)	-9.1					
				Dense to very dense gray micaceous silty medium to fine SAND / medium to fine sandy SILT						
			SS	Continued on Sheet 2 of 2 (Residual 2 Soil)						

Completion Depth: 60.0 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

ft., After _____ hrs.

15/15 BORING POST SUBSTATION.GPJ

LOG of BORING No. B-3

Sheet 2 of 2

DATE 10/13/14 SURFACE ELEVATION 32.4 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Dense to very dense gray micaceous silty medium to fine SAND / medium to fine sandy SILT						
50		35	SS							
55		38	SS							
60		46	SS	(Residual 2 Soil)	-27.6					
65				END OF BORING						
70				Notes: 1. Boring offset 15 feet west, due to fence and curb. 2. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 3. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 4. The borehole was backfilled with cement/bentonite grout at completion. 5. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 6. Temporary two-inch diameter PVC ground water observation well was installed to a depth of approximately 65 ft below the existing ground surface with the bottom 10 ft screened.						
75				Date GW Depth (ft) GW Elev (ft) 10/21/2014 13.0 19.4 +/- 10/23/2014 10.0 22.4 +/-						
80										
85										

Completion Depth: 60.0 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

LOG of BORING No. B-4

Sheet 1 of 2

DATE 10/14/14 SURFACE ELEVATION 29.1 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Coarse Aggregate (approx. 6")	28.6					
			AU	Firm to stiff gray and brown silty CLAY						
			AU	(Fill)	26.1					
5				Firm to stiff gray fine sandy silty CLAY / clayey SILT						
		14	SS	(Fine Grained Alluvial Soil)	19.6	2.5-2.8				
10		11	SS	Medium dense to very dense brown silty medium to fine SAND						
		36	SS		15.1					
15		24	SS	Medium dense to dense silty coarse to fine SAND and coarse to fine GRAVEL						
		10	SS	(Coarse Grained Alluvial Soil)	11.1					
		14	SS	Medium dense to dense brown and gray slightly micaceous silty medium to fine SAND						
20				(Residual 1 Soil)	6.1					
		50/6"	SS	Very dense brown and gray decomposed rock friable to silty medium to fine SAND			23.8			M
25				(Decomposed Rock)	3.6					
		NQ 100	NQ	Hard slightly weathered to fresh gray GRANITIC GNEISS, fractures inclined approximately 10 to 20 degrees and 60 to 80 degrees from the horizontal, fracture spacing typically ranges from 1 to 18 inches.						RQD 78 U
30										
		NQ 82	NQ							RQD 72
35				(Bedrock)	-6.4					
				END OF BORING						
40										

Continued on Sheet 2 of 2

Completion Depth: 35.5 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

ft., After _____ hrs.

LOG of BORING No. B-4DATE 10/14/14 SURFACE ELEVATION 29.1 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				<p>Notes:</p> <p>1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools.</p> <p>2. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum.</p> <p>3. Drilling resistance (i.e. rig chatter) noted at approximately 24.5 to 25.5 feet, which may be indicative of gravel and/or cobbles.</p> <p>4. The borehole was backfilled with cement/bentonite grout at completion.</p> <p>5. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil.</p> <p>6. 24 hour ground water level reading taken inside augers before water was introduced for coring on the second day of drilling.</p> <p> <u>Date</u> <u>GW Depth (ft)</u> <u>GW Elev (ft)</u> 10/31/2014 13.0 16.1 +/- </p>						
50										
55										
60										
65										
70										
75										
80										
85										

Completion Depth: 35.5 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

LOG of BORING No. B-5

Sheet 1 of 2

DATE 10/13/14 SURFACE ELEVATION 33.0 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Asphalt Pavement (approx. 3" to 6")	32.5					
			AU							
			AU	Brown silty coarse to fine SAND and coarse to fine GRAVEL, with cobble to boulder sized debris (concrete)						
5			AU	(Fill)	27.0					
			AU	Firm to stiff brown and gray silty CLAY, trace fine sand						
7			SS			0.8				
10			P				19.9	28	20	MT
21			SS	(Fine Grained Alluvial Soil)	19.0					
15			SS	Dense brown silty fine SAND						18.9
23			SS							
30			SS	- becoming very dense clayey coarse to fine SAND, trace fine gravel						
20				(Coarse Grained Alluvial Soil)	11.5					
			SS	Medium dense to dense gray micaceous silty fine SAND / fine sandy SILT						
25										
28			SS							
30										
26			SS							
35				(Residual 1 Soil)	-3.5					
			SS	Dense to very dense gray micaceous silty fine SAND / fine sandy SILT						
40										
			SS	Continued on Sheet 2 of 2 (Residual 2 Soil)						
31										

Completion Depth: 58.3 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

ft., After _____ hrs.

LOG of BORING No. B-5

Sheet 2 of 2

DATE 10/13/14 SURFACE ELEVATION 33.0 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to very dense gray micaceous silty fine SAND / fine sandy SILT (Residual 2 Soil)	-13.5					
50		53	SS	Very dense gray decomposed rock friable to silty coarse to fine SAND, with relict rock structure						
55		70	SS							
60		50/3"	SS	(Decomposed Rock)	-25.3					
65				END OF BORING						
70				Notes: 1. Boring offset 15 feet north, due to overhead utilities. 2. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 3. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 4. Drilling resistance (i.e. rig chatter) noted at approximately 56 feet, which may be indicative of gravel and/or cobbles. 5. Values listed under "OTHER TESTS" are headspace readings in parts per million obtained with a PID. 6. The borehole was backfilled with cement/bentonite grout at completion. 7. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 8. Groundwater observed at approximately 16 feet below ground surface after completion of drilling.						
75										
80										
85										

Completion Depth: 58.3 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

15115 BORING POST SUBSTATION.GPJ

LOG of BORING No. B-6

Sheet 1 of 2

DATE 10/13/14 SURFACE ELEVATION 32.3 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Asphalt Pavement (approx. 3" to 6") and Coarse Aggregate	31.3					
			AU	Subgrade (approx. 6")						
			AU	Dense brown silty coarse to fine SAND and coarse to fine GRAVEL	28.8					
5			AU	(Fill)						
			AU	Stiff to very stiff gray and brown fine sandy CLAY						
26			SS							
10			24	SS		3.8-4.0	16.6	25	17	M 6.9 279.0
			25	SS						
15			16	SS	(Fine Grained Alluvial Soil)	16.3	1.5			3.8
			58	SS	Very dense brown silty coarse to fine SAND, trace fine gravel					
31			SS		(Coarse Grained Alluvial Soil)	10.8				M
25			7	SS	Medium dense to dense gray micaceous silty medium to fine SAND					
30			15	SS			24.3			M
35			24	SS						
40			26	SS	(Residual 1 Soil)	-7.7				
				END OF BORING						

Continued on Sheet 2 of 2

Completion Depth: 40.0 ft. Water Depth: See ft., After _____ hrs.
 Project No.: 20000621 Notes ft., After _____ hrs.
 Project Name: Proposed PECO Post Substation ft., After _____ hrs.
 Drilling Method: Hollow Stem Augers- Auto Hammer ft., After _____ hrs.

LOG of BORING No. B-6DATE 10/13/14 SURFACE ELEVATION 32.3 LOCATION See Plate 2

DEPTH, FT. SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45			Notes: 1. Boring offset 25 feet north, due to overhead utilities. 2. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 3. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 4. Values listed under "OTHER TESTS" are headspace readings in parts per million obtained with a PID. 5. The borehole was backfilled with cement/bentonite grout at completion. 6. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 7. Groundwater observed at approximately 14 feet below ground surface after completion of drilling.						
50									
55									
60									
65									
70									
75									
80									
85									

Completion Depth: 40.0 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

LOG of BORING No. B-7

Sheet 1 of 2

DATE 10/14/14 SURFACE ELEVATION 24.5 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Coarse Aggregate (approx. 6 inches)	24.0					
			AU	Firm to stiff gray clayey SILT with gravel						
			AU	(Fill)	21.5					
5			AU	Firm to stiff gray fine sandy silty CLAY / clayey SILT						
			AU							
7			SS			1.5-2.0	21.1	29	18	M
10			SS			1.5-2.0	19.8			
8			SS			0.8-1.0	18.2			
14			SS	(Fine Grained Alluvial Soil)	8.9		17.9			
34			SS	Very dense brown silty coarse to fine gravelly coarse to fine SAND			16.1			M
				(Coarse Grained Alluvial Soil)	6.5					
2			SS	Loose to dense gray to light gray micaceous medium to fine sandy SILT / silty medium to fine SAND		0.5-0.8	38.7			M
25			SS				29.1			
				(Residual 1 Soil)	-2.0					
50/0"			SS							
NQ 100			NQ	Hard slightly weathered to fresh gray GRANITIC GNEISS, fractures inclined approximately 0 to 20 degrees from the horizontal, fracture spacing typically ranges from 4 to 30 inches.						RQD 100
NQ 58			NQ							RQD 57
				(Bedrock)	-12.0					
				END OF BORING						

Continued on Sheet 2 of 2

Completion Depth: 36.5 ft. Water Depth: See ft., After _____ hrs.
 Project No.: 20000621 Notes ft., After _____ hrs.
 Project Name: Proposed PECO Post Substation ft., After _____ hrs.
 Drilling Method: Hollow Stem Augers- Auto Hammer ft., After _____ hrs.

LOG of BORING No. B-7

Sheet 2 of 2

DATE 10/14/14 SURFACE ELEVATION 24.5 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Notes: 1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 2. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 3. Drilling resistance (i.e. rig chatter) noted at approximately 25 to 26.5 feet, which may be indicative of gravel and/or cobbles. 4. The borehole was backfilled with cement/bentonite grout at completion. 5. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 6. Groundwater observed at approximately 12 feet below ground surface after completion of drilling.						
50										
55										
60										
65										
70										
75										
80										
85										

Completion Depth: 36.5 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

LOG of BORING No. B-8

Sheet 1 of 2

DATE 10/15/14 SURFACE ELEVATION 28.8 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Coarse Aggregate (approx. 12 inches)	27.8					
			AU	Firm to stiff gray silty CLAY with trace brick and wood fragments						
			AU	(Fill)	23.8					
5			AU	Firm to stiff brown gray fine sandy clayey SILT / silty CLAY						
12			SS			0.5				
10		P	P	(Fine Grained Alluvial Soil)	17.2	0.8-1.0	23.0	35	21	MC
13			SS	Medium dense to very dense brown silty medium to fine SAND with coarse to fine gravel						3.4
15		36	SS							
		29	SS							
17			SS	- light gray						
20				(Coarse Grained Alluvial Soil)	7.3					
		31	SS	Medium dense to very dense gray micaceous silty medium to fine SAND						
25										
		16	SS							
30				(Residual 1 Soil)	-2.7					
		50/2"	SS	Very dense gray micaceous decomposed rock friable to silty coarse to fine SAND, relict rock structure						
35				(Decomposed Rock)	-7.4					
		50/1"	SS	Hard slightly weathered to fresh gray GRANITIC GNEISS, fractures inclined approximately 0 to 20 degrees from the horizontal, fracture spacing typically ranges from 1.5 to 16 inches.						
40		NQ 80	NQ	(Bedrock)	-12.2					RQD 67
				END OF BORING						
				Continued on Sheet 2 of 2						

Completion Depth: 41.0 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

ft., After _____ hrs.

LOG of BORING No. B-8

Sheet 2 of 2

DATE 10/15/14 SURFACE ELEVATION 28.8 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				<p>Notes:</p> <p>1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools.</p> <p>2. Ground surface elevation at the center test boring was provided by URS survey in NAVD 88 datum.</p> <p>3. Drilling resistance (i.e. rig chatter) noted at approximately 34 to 36 feet, which may be indicative of gravel and/or cobbles.</p> <p>4. Values listed under "OTHER TESTS" are headspace readings in parts per million obtained with a PID.</p> <p>5. The borehole was backfilled with cement/bentonite grout at completion.</p> <p>6. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil.</p> <p>7. Groundwater observed at approximately 13 feet below ground surface after completion of drilling.</p>						
50										
55										
60										
65										
70										
75										
80										
85										

Completion Depth: 41.0 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

LOG of BORING No. B-9

Sheet 1 of 3

DATE 10/15/14 SURFACE ELEVATION 27.2 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Coarse Aggregate with slag (approx. 12 inches)	26.2					
			AU	Firm to stiff gray silty CLAY						
			AU	(Fill)	24.2					
5			AU	Firm gray and brown fine sandy silty CLAY /clayey SILT						
			AU							
9			SS	(Fine Grained Alluvial Soil)	17.2					134.0
10			SS	Medium dense to very dense gray brown silty fine SAND						266.0
10			SS							1240.0
15			22 SS							39.0
			30 SS	- becoming brown silty coarse to fine sandy GRAVEL (Coarse Grained Alluvial Soil)	9.2					19.0
20			9 SS	Medium dense gray micaceous silty medium to fine SAND						
				(Residual 1 Soil)	4.2					
25			52 SS	Very dense gray micaceous silty medium to fine SAND						
			39 SS							
30										
			62 SS	(Residual 2 Soil)	-7.3					
35				Very dense gray micaceous silty coarse to fine SAND and coarse to fine GRAVEL						
			50/5" SS							
40										
			81 SS							

Continued on Sheet 2 of 3 (Decomposed Rock)

Completion Depth: 68.0 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

ft., After _____ hrs.

LOG of BORING No. B-9

Sheet 2 of 3

DATE 10/15/14 SURFACE ELEVATION 27.2 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45										
		50/1"	SS	Very dense gray decomposed rock, partially friable to silty coarse to fine SAND and coarse to fine GRAVEL, with relict rock structure						
50										
		50/1"	SS							
55										
				(Decomposed Rock)	-30.8					
60		NQ 92	NQ	Hard slightly weathered GRANITIC GNEISS, fractures inclined approximately 15 to 45 degrees from the horizontal, fracture spacing typically ranges from 1 to 9 inches.						RQD 53
65		NQ 100	NQ							
				(Bedrock)	-40.8					RQD 60
70				END OF BORING						
				Notes: 1. Boring offset 22 feet east, due to overhead utilities. 2. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 3. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 4. Drilling resistance (i.e. rig chatter) noted at approximately 36 feet and 47 to 58 feet, which may be indicative of gravel and/or cobble-sized rock fragments. 5. Values listed under "OTHER TESTS" are headspace readings in parts per million obtained with a PID. 6. Boring advanced by mud rotary drilling methods from 53 feet to 58 feet.						
75										
80										
85										

Continued on Sheet 3 of 3

Completion Depth: 68.0 ft. Water Depth: See ft., After _____ hrs.
 Project No.: 20000621 Notes ft., After _____ hrs.
 Project Name: Proposed PECO Post Substation ft., After _____ hrs.
 Drilling Method: Hollow Stem Augers- Auto Hammer ft., After _____ hrs.

LOG of BORING No. B-9DATE 10/15/14 SURFACE ELEVATION 27.2 LOCATION See Plate 2

DEPTH, FT. SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			Notes: (continued) 7. The borehole was backfilled with cement/bentonite grout at completion. 8. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 9. Groundwater observed at approximately 13 feet below ground surface after completion of drilling. 10. Petroleum odor present from 1 foot to 18 feet below ground surface.						
95									
100									
105									
110									
115									
120									
125									
130									

Completion Depth: 68.0 ft.Water Depth: See ft., After _____ hrs.Project No.: 20000621Notes ft., After _____ hrs.Project Name: Proposed PECO Post Substation

_____ ft., After _____ hrs.

Drilling Method: Hollow Stem Augers- Auto Hammer

_____ ft., After _____ hrs.

LOG of TEST PIT No. TP - 1

Sheet 1 of 1

DATE 1/22/15 SURFACE ELEVATION 32.7 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0			Asphalt Pavement (approx. 2")	32.5	
			Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate)	31.7	0 M
			(Subbase)		0.0
			Medium dense dark brown silty coarse to fine SAND and coarse to fine GRAVEL, with cobble to boulder-sized debris		0.0
			(Fill)	28.7	0.0
1.8-2.3			Very stiff to hard grayish brown clayey SILT, trace fine sand		0.0
5					0.0
		>4.5	(Fine-Grained Alluvial Soil)	24.7	0.0
			END OF TEST PIT		
10			Notes: 1. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 8.0 ft.Water Depth, ft.: >8.0Project Name: PECO Post SubstationProject No.: 20000621.00004

LOG of TEST PIT No. TP - 2

Sheet 1 of 1

DATE 1/23/15 SURFACE ELEVATION 32.5 LOCATION See Plate 2

DEPTH, FT. SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0		Asphalt Pavement (approx. 3")	32.3	
		Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate)	31.5	
		(Subbase)		
		Soft to firm brown clayey SILT, with coarse to fine gravel and coarse to fine sand, trace cobbles		
		HISTORIC FOUNDATIONS AND STRUCTURES ENCOUNTERED DURING TEST PIT EXCAVATION. SEE PLATE 2 AND PHOTO LOG FOR DIMENSIONS AND ADDITIONAL INFORMATION.		X
0.5- 1.0				0.0
		(Fill)	26.0	
		END OF TEST PIT		
		Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 3.0 to 3.5 ft depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 6.5 ft.Water Depth, ft.: >6.5Project Name: PECO Post SubstationProject No.: 20000621.00004

LOG of TEST PIT No. TP - 3

Sheet 1 of 1

DATE 1/22/15 SURFACE ELEVATION 31.8 LOCATION See Plate 2

DEPTH, FT. SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0		Asphalt Pavement (approx. 3")	31.5	
		Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate)	31.1	
		(Subbase)		
1.0- 1.3		Soft to firm gray brown clayey SILT/ silty CLAY, some coarse to fine sand and coarse to fine gravel		0.0 M W
		HISTORIC FOUNDATIONS AND STRUCTURES ENCOUNTERED DURING TEST PIT EXCAVATION. SEE PLATE 2 AND PHOTO LOG FOR DIMENSIONS AND ADDITIONAL INFORMATION.		
5		(Fill)	25.8	
		END OF TEST PIT		
10		Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 6.0 ft.Water Depth, ft.: >6.0Project Name: PECO Post SubstationProject No.: 20000621.00004

LOG of TEST PIT No. TP - 4

Sheet 1 of 1

DATE 1/23/15 SURFACE ELEVATION 31.5 LOCATION See Plate 2

DEPTH, FT. SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0		Asphalt Pavement (approx. 4")	31.2	
		Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate) (Subbase)	29.7	
		Medium dense to dense dark brown coarse SAND and coarse to fine GRAVEL, trace cobbles (Fill)	28.0	0.0
1.0- 2.0		Firm to stiff grayish brown silty CLAY, with coarse to fine sand		0.0 M X
5		HISTORIC FOUNDATIONS AND STRUCTURES ENCOUNTERED DURING TEST PIT EXCAVATION. SEE PLATE 2 AND PHOTO LOG FOR DIMENSIONS AND ADDITIONAL INFORMATION. (Fill- Depth Varies)	24.5	0.0
3.3- 4.3		Very stiff to hard grayish brown fine sandy SILT, trace clay (Fine-Grained Alluvial Soil)	23.5	
		END OF TEST PIT		
10		Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 4.0 to 4.5 ft. depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. The thickness of Fill varies across the test pit from approximately 3.5 to 7.0 ft. 5. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 8.0 ft.Water Depth, ft.: >8.0Project Name: PECO Post SubstationProject No.: 20000621.00004

LOG of TEST PIT No. TP - 5

Sheet 1 of 1

DATE 1/20/15 SURFACE ELEVATION 33.0 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0			Asphalt Pavement (approx. 3")	32.7	
			Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate)	31.8	0.0
			(Subbase)		M
			Dense brown COBBLES and fine GRAVEL, with coarse sand	30.9	0.0
			(Ballast)		
2.3-3.3			Very stiff to hard dark brown clayey SILT, some coarse to fine gravel and coarse to fine sand, trace cobble to boulder-sized debris		0.0
3.8-4.5					X
					0.0
3.8-4.5					0.0
5			(Fill)	27.6	
4.5			Hard brown fine sandy silty CLAY		0.0
					0.0
			(Fine-Grained Alluvial Soil)	25.0	0.0
			END OF TEST PIT		
10			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 3.0 to 3.5 ft. depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 8.0 ft.Water Depth, ft.: >8.0Project Name: PECO Post SubstationProject No.: 20000621.00004

LOG of TEST PIT No. TP - 6

Sheet 1 of 1

DATE 1/21/15 SURFACE ELEVATION 32.3 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0			Asphalt Pavement (approx. 4")	32.0	
			Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate)	31.8	0.0
			(Subbase)		
			Dense brown COBBLES and fine GRAVEL, with coarse sand	30.5	
			(Ballast)		
>4.5			Stiff to hard dark brown clayey SILT, some coarse to fine gravel and coarse to fine sand, trace cobble-sized concrete debris and wood debris		3.0
>4.5					X
					10.0
1.5-2.3			(Fill)	27.3	300
5			Stiff to very stiff brown fine sandy silty CLAY		
					X
1.8-2.5			(Fine-Grained Alluvial Soil)	24.9	300
			END OF TEST PIT		
10			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 2.5 to 3.0 ft. and 6.0 to 6.4 ft. depth intervals and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 7.4 ft.Water Depth, ft.: >7.4Project Name: PECO Post SubstationProject No.: 20000621.00004

LOG of TEST PIT No. TP - 7

Sheet 1 of 1

DATE 1/21/15 SURFACE ELEVATION 32.9 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0			Asphalt Pavement (approx. 5")	32.5	
			Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate)	32.2	
			(Subbase)	31.5	
			Dense brown COBBLES and fine GRAVEL, with coarse sand		
			(Ballast)		
			Stiff gray fine sandy SILT, little clay, trace coarse to fine gravel		0.0
5			- becoming dense brown coarse to fine SAND, little coarse to fine gravel, trace silt and cobble-sized brick debris		0.0
			(Fill)	27.4	
		1.5-2.0	Firm to stiff brown fine sandy silty CLAY		0.0
			(Fine-Grained Alluvial Soil)	23.4	
10			END OF TEST PIT		
			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 9.5 ft.Water Depth, ft.: >9.5Project Name: PECO Post SubstationProject No.: 20000621.00004

LOG of TEST PIT No. TP - 8

Sheet 1 of 1

DATE 1/21/15 SURFACE ELEVATION 32.8 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0			Asphalt Pavement (approx. 4")	32.5	
			Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate)	32.0	0.0
			(Subbase)		
			Dense brown COBBLES and fine GRAVEL, with coarse sand	31.1	
			(Ballast)		
>4.5			Hard gray clayey SILT / silty CLAY, little fine gravel, cobbles, brick fragments		65 M
>4.5					3.3 M
				28.3	
5			Dense dark gray coarse to fine SAND and coarse to fine GRAVEL, trace silt		0.0
			- becoming clayey		3.1
			(Fill)	25.0	
		1.0-1.8	Firm to stiff brown clayey SILT		4.2
			(Fine-Grained Alluvial Soil)	23.3	
10			END OF TEST PIT		
			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 9.5 ft.Water Depth, ft.: 9.3Project Name: PECO Post SubstationProject No.: 20000621.00004

LOG of TEST PIT No. TP - 9

Sheet 1 of 1

DATE 1/26/15 SURFACE ELEVATION 24.4 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0			Medium dense to dense gray coarse to fine SAND and coarse to fine GRAVEL, trace silt		0.0
			(Fill)	22.5	0.0
		>4.5	Very stiff to hard brown sandy clayey SILT		X 0.0 T C
		3.8-4.5			0.0
5		1.5-3.0			0.0
			(Fine-Grained Alluvial Soil)	17.4	
			END OF TEST PIT		
10			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 2.5 to 3.0 ft. depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 7.0 ft.Water Depth, ft.: >7.0Project Name: PECO Post SubstationProject No.: 20000621.00004


LOG of TEST PIT No. TP -10


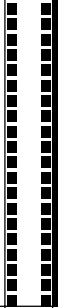
Sheet 1 of 1

DATE 1/26/15 SURFACE ELEVATION 27.8 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
0			Medium dense brown coarse to fine sandy coarse to fine GRAVEL		0.0
			(Fill)	26.5	
>4.5			Hard brown fine sandy clayey SILT		0.0
>4.5					0.0
>4.5					C
					X
					0.0
5			(Fine-Grained Alluvial Soil)	21.8	
			END OF TEST PIT		
10			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 3.5 to 4.0 ft. depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		

Completion Depth: 6.0 ft.Water Depth, ft.: >6.0Project Name: PECO Post SubstationProject No.: 20000621.00004

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-001	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 3/22/16	COMPLETED: 3/22/16	*NORTHING (ft): 182451.82	*EASTING (ft): 2620086.75
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 2.0	BOREHOLE DEPTH (ft): 2
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace P1D (ppm)	Depth (feet)
1		CL	Soft CLAY, grayish-blue, high plasticity, odor present		AOI5-BH-16-001 (0-2')			1596	
2			End of boring at 2.0'						
3									
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-002**

DRILLING: STARTED **3/22/16** COMPLETED: **3/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182582.11** *EASTING (ft): **2620283.28**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			Large COBBLE mixed in with bluish-gray CLAY and subangular GRAVEL, odor present		AOI5-BH-16-002 (0-2')			56.7	
2			Same as above but subangular gravel instead of large cobble		--			240	
3					AOI5-BH-16-002 (3-4')			797	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:

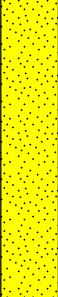
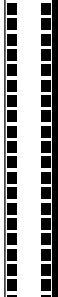

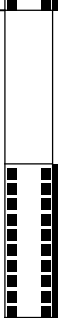
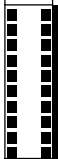
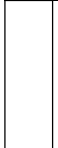


PAGE 1 OF 1 **AOI5-BH-16-003**

DRILLING: STARTED **3/22/16** COMPLETED: **3/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182688.45** *EASTING (ft): **2620448.47**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **5.0** BOREHOLE DEPTH (ft): **5**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SP	Yellow-brown SAND with medium subangular gravel		AOI5-BH-16-003 (0-2')			0.0	
2		CL	Bluish-gray CLAY with olive mottling, medium plasticity		--			0.0	
3			Odor present at 3.0'		AOI5-BH-16-003 (3-4')			159	
4					--			57.7	
5			End of boring at 5.0'						5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 2 **AOI5-BH-16-004**

DRILLING: STARTED **3/22/16** COMPLETED: **3/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182311.19** *EASTING (ft): **2620462.27**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **6.5** BOREHOLE DEPTH (ft): **6.5**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL, sandy, with large cobble						
1		CL	Reddish-brown CLAY, medium plasticity, firm, no odor/staining		AOI5-BH-16-004 (0-2')				
2									
3			Slight odor at 3.0'		--			20.9	
4		CL	Same as above but clay is light bluish-gray, odor		--			26.0	
5									5
6									
7			End of boring at 6.5'						
8					AOI5-BH-16-004 (5-6')			64.4	
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 2 OF 2 AOI5-BH-16-004	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 3/22/16	COMPLETED: 3/22/16	*NORTHING (ft): 182311.19	*EASTING (ft): 2620462.27
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 6.5	BOREHOLE DEPTH (ft): 6.5
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:

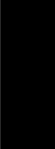
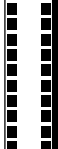

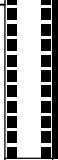
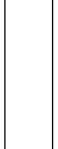

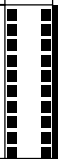
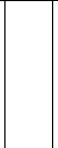



PAGE 1 OF 1 **AOI5-BH-16-005**

DRILLING: STARTED **3/22/16** COMPLETED: **3/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182421.26** *EASTING (ft): **2620623.03**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			ASPHALT followed by large cobbles						
1		CL-ML	Silty CLAY, bluish-gray, slight odor present, medium plasticity		AOI5-BH-16-005 (0-2')			4.0	
2					-			0.0	
3		CL-ML	Same as above but high plasticity, no odor or staining		AOI5-BH-16-005 (3-4')			0.0	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-006**

DRILLING: STARTED **3/22/16** COMPLETED: **3/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182128.88** *EASTING (ft): **2620816.53**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **5.5**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SM	Silty SAND with large cobble, no odor/staining		AOI5-BH-16-006 (0-2')			0.0	
2					--		0.0		
3		CL-ML	Silty CLAY, compact, bluish gray, very stiff		AOI5-BH-16-006 (3-4')			5.9	
4					--		4.8		
5		SP	Transition back to black SAND with large cobble, wet, some odor/staining						5
6			End of boring at 5.5'						
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-007**

DRILLING: STARTED **3/22/16** COMPLETED: **3/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182926.3** *EASTING (ft): **2620618.95**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			SAND, subangular, medium sized gravel						
1			Red/brown CLAY, some subangular medium sized gravel		AOI5-BH-16-007 (0-2')			0.0	
2					--			0.0	
3			Same as above but olive/gray		AOI5-BH-16-007 (3-4')			0.0	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-008**

DRILLING: STARTED **3/22/16** COMPLETED: **3/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183013.62** *EASTING (ft): **2620758.97**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		CL	Olive CLAY with trace silt, no odor or staining, medium plasticity		AOI5-BH-16-008 (0-2')			0.0	
2		CL	Reddish-brown CLAY, firm, medium plasticity, no odor or staining						
3		CL	Bluish-gray CLAY, firm, medium plasticity, no odor/staining						
4		CL	Silty CLAY, bluish-gray, moist, no odor or staining						
			End of boring at 4.0'						
5					AOI5-BH-16-008 (3-4')			0.0	5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:


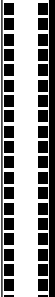



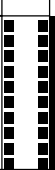



PAGE 1 OF 1 **AOI5-BH-16-009**

DRILLING: STARTED **3/22/16** COMPLETED: **3/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183101.56** *EASTING (ft): **2620890.74**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GC	Subangular GRAVEL with bluish-gray clay, olive mottling, odor present, clay medium plasticity		AOI5-BH-16-009 (0-2')			236	
2		CL	Bluish-gray CLAY with olive mottling, slight odor, clay very stiff		-			9.8	
3		CL-ML	Silty CLAY, bluish-gray, odor present		AOI5-BH-16-009 (3-4')			145	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-010**


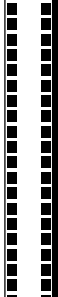

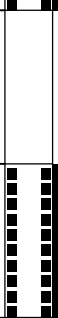

DRILLING: STARTED **3/23/16** COMPLETED: **3/23/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**


*NORTHING (ft): **183286.8** *EASTING (ft): **2621177.03**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**




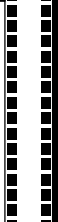

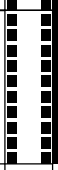

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SM	Silty SAND, brown/gray ???, fine, odor present		AOI2-BH-16-010 (0-2')			100	
2		CLS	Sandy CLAY, sand yellow-brown with bluish-gray clay, odor and staining present, sand fine, clay firm		--			240	
3		CL	Bluish-gray CLAY with olive mottling, moist, odor and staining present, medium plasticity		AOI2-BH-16-010 (3-4')			399	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-011		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/23/16	COMPLETED: 3/23/16	*NORTHING (ft): 182572.3	*EASTING (ft): 2620847.86	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 4.0	BOREHOLE DEPTH (ft): 4	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SPG	Fine SAND with large cobble, brown, no odor or staining		AOI5-BH-16-011 (0-2')			0.0	
2		CL	Bluish-gray CLAY with olive mottling, no odor/staining, medium plasticity		--			0.0	
3		CL	Bluish-gray CLAY with brown sand, no odor or staining, moist, soft		AOI5-BH-16-011 (3-4')			0.0	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-012		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/23/16	COMPLETED: 3/23/16	*NORTHING (ft): 182657.02	*EASTING (ft): 2620986.4	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 3.0	BOREHOLE DEPTH (ft): 3	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL, large cobbles with fine sand						
1		CL	Bluish-gray CLAY, olive mottling, no odor or staining, medium plasticity		AOI5-BH-16-012 (0-2')			1.3	
2		SM	Bluish-gray, silty SAND, wet, no odor or staining, fine to coarse		AOI5-BH-16-012 (2-3')			0.0	
3			End of boring at 3.0'						
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:


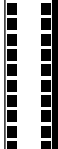

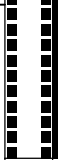








PAGE 1 OF 1 **AOI5-BH-16-013**

DRILLING: STARTED **3/23/16** COMPLETED: **3/23/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182747.13** *EASTING (ft): **2621122.17**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **5.0** BOREHOLE DEPTH (ft): **6**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL, asphalt followed by large cobble with fine sand						
1		CL	Bluish-gray CLAY with olive mottling, no odor, some black mottles as well, possibly staining		AOI5-BH-16-013 (0-2')			10.1	
2					--			35.1	
3					--			172.1	
4									
4					AOI5-BH-16-013 (4-5')			362.5	
5			Same as above but soil became moist						5
5					--			50.0	
6			End of boring at 6.0'						
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:













PAGE 1 OF 1 **AOI5-BH-16-014**

DRILLING: STARTED **3/23/16** COMPLETED: **3/23/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182931.5** *EASTING (ft): **2621411.75**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **3.0** BOREHOLE DEPTH (ft): **3**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL, sandy gravel						
1		CL	Bluish-gray CLAY, medium, plasticity, black mottles present, odor and staining present		AOI5-BH-16-014 (0-2')			38.2	
2									
3					AOI5-BH-16-014 (2-3')			79.2	
			End of boring at 3.0'						
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-015**


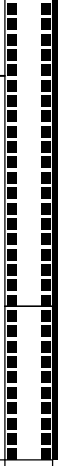


DRILLING: STARTED **3/23/16** COMPLETED: **3/23/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183024.44** *EASTING (ft): **2621661.88**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		CL	Very hard, bluish-gray CLAY, no odor or staining present		AOI5-BH-16-015 (0-2')			0.0	
2						--		2.6	
3		SM	Silty SAND with subangular gravel, black/brown, odor present, sand fine to coarse		AOI5-BH-16-015 (3-4')			15.3	
4				End of boring at 4.0'					
5									5
6									
7									
8									
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-016		
PROJECT NUMBER: 213402567		*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88		
DRILLING: STARTED 3/23/16	COMPLETED: 3/23/16	*NORTHING (ft): 182428.73	*EASTING (ft): 2621330.07	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 3	BOREHOLE DEPTH (ft): 3	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL, gravel						
1		CL	Bluish-gray CLAY with black staining, olive mottling, moist at 3'		AOI5-BH-16-016 (0-2')			53.1	
2									
3					AOI5-BH-16-016 (2-3')			122.0	
			End of boring at 3.0'						
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
LOCATION: **AOI 5 Characterization**
PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-017**


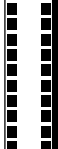

DRILLING: STARTED **3/23/16** COMPLETED: **3/23/16**
INSTALLATION: STARTED COMPLETED:
DRILLING COMPANY: **Sweeney**
DRILLING EQUIPMENT: **Backhoe Bucket**
DRILLING METHOD:
SAMPLING EQUIPMENT: **Backhoe Bucket**


*NORTHING (ft): **182616.05** *EASTING (ft): **2621619.82**
*GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **4**
STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**


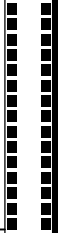

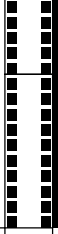

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		CL	Bluish-gray CLAY, medium plasticity, no odor/staining present		AOI5-BH-16-017 (0-2')			0.0	
2					--			0.0	
3					AOI5-BH-16-017 (3-4')			0.0	
4									
			End of boring at 4.0'						
5									5
6									
7									
8									
9									




PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-018		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/23/16	COMPLETED: 3/23/16	*NORTHING (ft): 182768.14	*EASTING (ft): 2621818.45	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 1.0	BOREHOLE DEPTH (ft): 1	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			Large COBBLES with coarse sand, gray/brown, no odor/staining		AOI-BH-16-018 (0-1')			0.0	
			End of boring at 1.0'						
2									
3									
4									
5									5
6									
7									
8									
9									




PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-023	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 3/29/16	COMPLETED: 3/29/16	*NORTHING (ft): 182828.41	*EASTING (ft): 2622226.82
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 3.0	BOREHOLE DEPTH (ft): 3
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GW-SW	Subangular GRAVEL with coarse beige sand, odor present		AOI5-BH-16-023 (0-2)			0.0	
2		GC	Subangular GRAVEL with bluish-gray clay, very malleable, moist, odor present		AOI5-BH-16-023 (2-3)			4.7	
3			End of boring at 3.0'						
4									
5									5
6									
7									
8									
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-024		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/29/16	COMPLETED: 3/29/16	*NORTHING (ft): 183050.64	*EASTING (ft): 2622432.55	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 2.0	BOREHOLE DEPTH (ft): 2	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GW-SW	Small, subangular GRAVEL with coarse sand, odor and staining present, black		AOI5-BH-16-024 (0-2)			96.0	
2			End of boring at 2.0'						
3									
4									
5									5
6									
7									
8									
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-025		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/29/16	COMPLETED: 3/29/16	*NORTHING (ft): 183122.68	*EASTING (ft): 2622547.13	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 2.0	BOREHOLE DEPTH (ft): 2	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GW-SW	Small, subangular GRAVEL with coarse sand, black, odor and staining present		AOI5-BH-16-025 (0-2)			279.9	
2			End of boring at 2.0'						
3									
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-026**

DRILLING: STARTED **3/29/16** COMPLETED: **3/29/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183142.65** *EASTING (ft): **2622649.56**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **3** BOREHOLE DEPTH (ft): **3**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
		SP	Beige, fine SAND, no odor or staining						
1		GC	Subangular GRAVEL with sandy clay, sand fine, clay very malleable, bluish gray, odor and staining present		AOI5-BH-16-026 (0-2)			297.8	
2									
3					AOI5-BH-16-026 (2-3)			149.2	
			End of boring at 3.0'						
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-027**


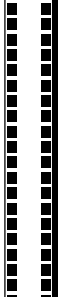
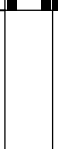
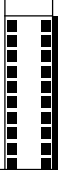

DRILLING: STARTED **3/29/16** COMPLETED: **3/29/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183054.11** *EASTING (ft): **2622586.19**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **3.0** BOREHOLE DEPTH (ft): **3**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL, gravel						
1		GP	Subangular GRAVEL with grayish-brown sand, odor/staining present, sand fine		AOI5-BH-16-027 (0-2)			39.6	
2									
3					AOI5-BH-16-027 (2-3)			9.4	
			End of boring at 3.0'						
4									
5									5
6									
7									
8									
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-028		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/28/16	COMPLETED: 3/28/16	*NORTHING (ft): 183164.35	*EASTING (ft): 2622741.58	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 4	BOREHOLE DEPTH (ft): 4	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GC	Medium subangular GRAVEL with sandy clay, odor/staining present, clay bluish-gray with coarse sand		AOI5-BH-16-028 (0-2')			5.9	
2		GP	Medium black, subangular GRAVEL, product visible throughout		-			9.3	
3					AOI5-BH-16-028 (3-4')			19.9	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
LOCATION: **AOI 5 Characterization**
PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-029**

DRILLING: STARTED **3/28/16** COMPLETED: **3/28/16**
INSTALLATION: STARTED COMPLETED:
DRILLING COMPANY: **Sweeney**
DRILLING EQUIPMENT: **Backhoe Bucket**
DRILLING METHOD:
SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183104.46** *EASTING (ft): **2622755.47**
*GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
INITIAL DTW (ft): **1** BOREHOLE DEPTH (ft): **1**
STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GC	Medium subangular GRAVEL with sandy clay, bluish gray clay with coarse sand, sheen present		AOI5-BH-16-029 (0-1')			0.0	
2									
3									
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
LOCATION: **AOI 5 Characterization**
PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-030**

DRILLING: STARTED **3/28/16** COMPLETED: **3/28/16**
INSTALLATION: STARTED COMPLETED:
DRILLING COMPANY: **Sweeney**
DRILLING EQUIPMENT: **Backhoe Bucket**
DRILLING METHOD:
SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183135.71** *EASTING (ft): **2622701.65**
*GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
INITIAL DTW (ft): **4.0** BOREHOLE DEPTH (ft): **4**
STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
		GPS	Sandy GRAVEL, gravel subangular, medium size, sand coarse, odor present						
1		SC	Dark bluish-gray, clayey SAND, odor present, sand fine, clay medium plasticity		AOI5-BH-16-030 (0-2')			11.4	
2									
3					AOI5-BH-16-030 (2-3')			19.9	
4			End of boring at 4.0'		--			10.6	
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:


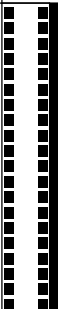

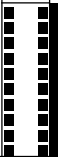




PAGE 1 OF 1 **AOI5-BH-16-031**

DRILLING: STARTED **3/28/16** COMPLETED: **3/28/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183188.66** *EASTING (ft): **2622696.44**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	
1		GC	Subangular GRAVEL with sandy clay, slight odor present		OI5-BH-16-0.31 (0-2')			0.0		
2		GC	Same as above with stronger odor		--			0.0		
3						OI5-BH-16-0.31 (3-4')			0.0	
4				End of boring at 4.0'						
5									5	
6										
7										
8										
9										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-032**




DRILLING: STARTED **3/28/16** COMPLETED: **3/28/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183424.79** *EASTING (ft): **2623031.51**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **5** BOREHOLE DEPTH (ft): **5**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GW-SW	Subangular GRAVEL with fine to coarse sand, no odor/staining		AOI5-BH-16-032 (0-2')			0.0	
2		CL	Bluish-gray, hard CLAY with olive mottling, no odor/staining		--			0.0	
3					--			0.0	
4		CL	Same as above but clay begins to moisten, becomes malleable		AOI5-BH-16-032 (4-5')			0.0	
5			End of boring at 5.0'						5
6									
7									
8									
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-033		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/28/16	COMPLETED: 3/28/16	*NORTHING (ft): 183374.84	*EASTING (ft): 2623109.63	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 2	BOREHOLE DEPTH (ft): 2	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GC	Medium subangular GRAVEL with bluish-gray, sandy clay, odor present		AOI5-BH-16-033 (0-2')			0.0	
2			Refusal at 2.0'. Moved North 10'						
3									
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:


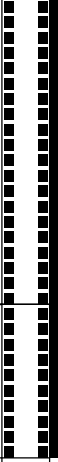



PAGE 1 OF 1 **AOI5-BH-16-034**

DRILLING: STARTED **3/28/16** COMPLETED: **3/28/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183495.97** *EASTING (ft): **2623146.09**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **3** BOREHOLE DEPTH (ft): **3**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GW-SW	Large subangular GRAVEL with brown, fine sand, slight odor present		AOI5-BH-16-034 (0-2')			6.9	
2		GW-SW	Same as above but bluish-gray sand		AOI5-BH-16-034 (2-3')			12.4	
3			Refusal at 3.0'. Moved North 10'						
4									
5									5
6									
7									
8									
9									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-035	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 3/24/16	COMPLETED: 3/24/16	*NORTHING (ft): 182076.42	*EASTING (ft): 2621073.4
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 4	BOREHOLE DEPTH (ft): 4.5
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL, dark brown, sandy gravel, staining present, slight odor, sand fine, gravel subangular		AOI5-BH-16-035 (0-2)			9.6	
2		CL	Gray CLAY with staining and odor present, very firm		--			12.7	
3		CL	Same as above with more staining and moist, some wood debris		AOI5-BH-16-035 (3-4)			18.9	
4									
5			End of boring at 4.5'						5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:


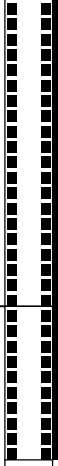

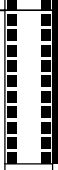



PAGE 1 OF 1 **AOI5-BH-16-036**

DRILLING: STARTED **3/24/16** COMPLETED: **3/24/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182167.07** *EASTING (ft): **2621228.55**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GW-SW	Medium subangular GRAVEL with coarse sand, staining and odor present		AOI5-BH-16-036 (0-2)			44.0	
2		CL	Bluish-gray CLAY with medium subangular gravel, staining and odor present, medium plasticity		AOI5-BH-16-036 (2-3)			125.1	
3					--			53.2	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
LOCATION: **AOI 5 Characterization**
PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-037**

DRILLING: STARTED **3/24/16** COMPLETED: **3/24/16**
INSTALLATION: STARTED COMPLETED:
DRILLING COMPANY: **Sweeney**
DRILLING EQUIPMENT: **Backhoe Bucket**
DRILLING METHOD:
SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **182018.8** *EASTING (ft): **2621322.29**
*GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
INITIAL DTW (ft): **3** BOREHOLE DEPTH (ft): **3**
STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL, light brown, sandy fill with medium subangular gravel						
1		CL	Bluish-gray CLAY with medium subangular gravel, odor/staining present		AOI5-BH-16-037 (0-2)			6.9	
2									
		CL	Bluish-gray CLAY with fine gray sand, odor/staining present		AOI5-BH-16-037 (2-3)			0.0	
3			End of boring at 3.0'						▽
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




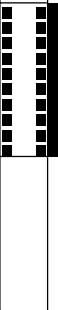



PAGE 1 OF 1 **AOI5-BH-16-038**

DRILLING: STARTED **3/24/16** COMPLETED: **3/24/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **181933.75** *EASTING (ft): **2621174.29**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **5** BOREHOLE DEPTH (ft): **5**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)		
1			FILL, medium subangular gravel with brown fine sand, no odor or staining		AOI5-BH-16-038 (0-2)			0.0			
2											
3		CL	Bluish-gray CLAY with purple and olive mottling, no odor, purple seems to be staining		AOI5-BH-16-038 (3-4)			2.7			
4											
5								--		0.0	
5			End of boring at 5.0'						5		
6											
7											
8											
9											

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-039		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/24/16	COMPLETED: 3/24/16	*NORTHING (ft): 181818.98	*EASTING (ft): 2621362.04	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 3	BOREHOLE DEPTH (ft): 5	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: C. Dubinski	CHECKED BY: J. DeBoer	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL, subangular gravel						
1		CLS	Sandy CLAY, medium plasticity, no odor/staining		AOI5-BH-16-039 (0-2)			0.0	
2		CL	Dark gray CLAY hard, no odor/staining, some olive mottling		AOI5-BH-16-039 (2-3)			0.0	
3									
4		CL	CLAY with subrounded, small cobble, odor present, wet		--			0.0	
5			End of boring at 5.0'		--			0.0	
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
LOCATION: **AOI 5 Characterization**
PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-040**

DRILLING: STARTED **3/24/16** COMPLETED: **3/24/16**
INSTALLATION: STARTED COMPLETED:
DRILLING COMPANY: **Sweeney**
DRILLING EQUIPMENT: **Backhoe Bucket**
DRILLING METHOD:
SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **181716.55** *EASTING (ft): **2621426.71**
*GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
INITIAL DTW (ft): **3.0** BOREHOLE DEPTH (ft): **3**
STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL, subangular gravel						
1			Same as above but with introduction of coarse to fine sand, no odor/staining		AOI5-BH-16-040 (0-2)			0.0	
2		CLS	Sandy CLAY, sand fine, clay somewhat firm but malleable, moist		AOI5-BH-16-040 (2-3)			0.0	
3			End of boring at 3.0'						▼
4									
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:


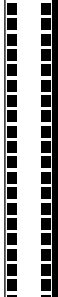

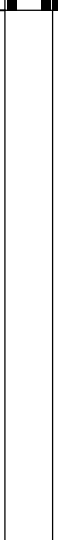

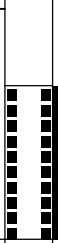

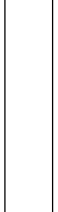

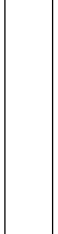





PAGE 1 OF 1 **AOI5-BH-16-041**

DRILLING: STARTED **3/24/16** COMPLETED: **3/24/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **181896.24** *EASTING (ft): **2621489.21**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **7** BOREHOLE DEPTH (ft): **7**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SPG	Brown, very fine SAND with subangular gravel, no odor/staining		AOI5-BH-16-041 (0-2)			0.0	
2		CL	Gray CLAY with subangular gravel, firm, odor present		--			0.0	
3					--			0.0	
4					--			0.0	
5									5
6		CLS	Sandy CLAY, dark gray clay, light brown sand, odor/staining present		AOI5-BH-16-041 (6-7)			1.0	
7			End of boring 7.0'						
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:


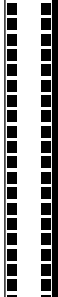

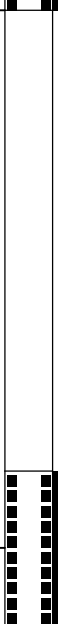
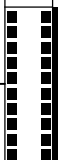



PAGE 1 OF 1 **AOI5-BH-16-042**

DRILLING: STARTED **3/24/16** COMPLETED: **3/24/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **181773.41** *EASTING (ft): **2621470.98**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **6** BOREHOLE DEPTH (ft): **6**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		GW-SW	Sandy GRAVEL, sand fine, gravel subangular, no odor/staining present		AOI5-BH-16-042 (0-2)			0.0	
2		CL	Bluish-gray CLAY, stiff, odor/staining present		--			0.0	
3					--			0.0	
4					--			0.0	
5					AOI5-BH-16-042 (5-6)			0.0	5
6		CL	Same as above transitioning into bluish-gray, sandy CLAY, wet						
			End of boring at 6.0'						
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-043**

DRILLING: STARTED **3/24/16** COMPLETED: **3/24/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **181676.62** *EASTING (ft): **2621476.62**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **4** BOREHOLE DEPTH (ft): **4**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace P/D (ppm)	Depth (feet)
1			FILL, sandy gravel, fine sand, subangular gravel with no odor/staining		AOI5-BH-16-043 (0-2)			0.0	
2		CL	Bluish-gray CLAY with olive mottles, firm, slight odor, medium plasticity		--			0.0	
3									
4		CL-ML	Silty CLAY with subangular gravel, slight odor, moist		AOI5-BH-16-043 (3-4)			0.0	
4			End of boring at 4.0'						
5									5
6									
7									
8									
9									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-044**

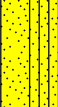


DRILLING: STARTED **3/28/16** COMPLETED: **3/28/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**


*NORTHING (ft): **181957.62** *EASTING (ft): **2621714.18**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **9** BOREHOLE DEPTH (ft): **9**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **C. Dubinski** CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL, brown, coarse sand with subangular gravel		AOI5-BH-16-044 (0-2')			0.0	
2		CL	Bluish-gray CLAY, odor present, medium plasticity		--			0.0	
3					--			0.0	
4					--			2.7	
5					--			4.4	5
6		CL	Same as above but clay more flaky, some olive mottling		--			4.4	
7					--			5.3	
8		SP	Transitioned over to bluish-gray, fine SAND, odor present		AOI5-BH-16-044 (8-9')			19.4	
9			Refusal at 9.0'. Moved North 15'						







PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-045	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 184324.02	*EASTING (ft): 2623082.7
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 4	BOREHOLE DEPTH (ft): 6
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SP-SM	brown SILT and grey fine SAND, damp/moist		AOI5-BH-16-045-0-2			0	
2		ML	brown to grey SILT, little fine SAND, trace wood, damp/moist		-			7.4	
3									
4		ML	brown to dark grey SILT, staining, wet						
5					AOI5-BH-16-045-4-6			32	5
6			End of boring at 6 ft bgs						
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-046	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 184292.1	*EASTING (ft): 2623134.75
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 4	BOREHOLE DEPTH (ft): 4
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL: dark brown to dark grey silt and fine sand, wood, brick and tarp fragments, some fine gravel, wet [sulfur dioxide= 0.1 ppm]		AOI5-BH-16-046-0-2			14.7	
2		ML	dark brown SILT, some fine sand, little fine gravel, wet						
3					AOI5-BH-16-046-2-6			4.7	
4			End of boring at 4 ft bgs						▽
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									






PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-047	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/8/16	COMPLETED: 6/8/16	*NORTHING (ft): 184212.3	*EASTING (ft): 2623151.97
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 8
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	dark grey SILT, some staining		AOI5-BH-16-047-0-2			7.7	
2									
3					-			4.7	
4									
5					-			1.8	5
6									
7		ML	black SILT, staining, (potentially acid sludge) [Hydrogen sulfide = 4.2 ppm]		AOI5-BH-16-047-6-8			7.6	
8									
9									
10			End of boring at 8 ft bgs						10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-048	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 184261	*EASTING (ft): 2623085.04
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 8	BOREHOLE DEPTH (ft): 9
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	brown SILT, dry [Hydrogen sulfide = 0.8 ppm]		AOI5-BH-16 -048-0-2			0.8	
2		ML	brown SILT, little medium gravel, moist [Sulfur dioxide = 0.1 ppm]		-			2.4	
3									
4		ML	brown SILT, little staining, moist		-			62.5	5
5									
6					AOI5-BH-16 -048-6-8			133.8	
7									
8		ML	brown SILT, some clay, staining, wet		-			62.9	9
9			End of boring at 9 ft bgs						
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									


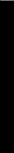



PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-049	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/8/16	COMPLETED: 6/8/16	*NORTHING (ft): 184730.21	*EASTING (ft): 2622692.26
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 2	BOREHOLE DEPTH (ft): 4
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	grey SILT, some brown tint, damp		AOI5-BH-16 -049-0-2			0	
2		ML	grey to dark grey SILT, trace fine sand, some brown staining, wet						
3			End of boring at 4 ft bgs		AOI5-BH-16 -049-3-4			68.8	
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									


PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-050	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/8/16	COMPLETED: 6/8/16	*NORTHING (ft): 184670.8	*EASTING (ft): 2622645.21
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 6	BOREHOLE DEPTH (ft): 6
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL; brown fine SAND and grey SILT, little cinders, damp		-			6.8	
1		ML	grey SILT, damp, soft		AOI5-BH-16 -050-1-2			223.2	
2		SP- SM	dark grey SILT and fine SAND, some medium gravel, damp/moist		AOI5-BH-16 -050-2-4			242.4	
3									
4		ML- SM	dark grey SILT, some fine sand, some medium gravel, damp/moist						
5					-			129.1	5
6			End of boring at 6 ft bgs						▼
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-051	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/8/16	COMPLETED: 6/8/16	*NORTHING (ft): 184780.49	*EASTING (ft): 2622670.89
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 5	BOREHOLE DEPTH (ft): 5
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	grey to dark grey SILT, slight brown staining, dry		AOI5-BH-16-051-0-2			156.1	
2			damp at 2 ft						
3					-			260.5	
4		SP-SM	grey to dark grey SILT and fine SAND, wet		AOI5-BH-16-051-4-5			321.7	 5
5			End of boring at 5 ft bgs						
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-052	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/8/16	COMPLETED: 6/8/16	*NORTHING (ft): 184756.12	*EASTING (ft): 2622538.43
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 1
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	brown SILT with some clay, wet (likely rain)		AOI5-BH-16 -052-0-1			1.1	
2			End of Boring at 1 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-053**

DRILLING: STARTED **6/8/16** COMPLETED: **6/8/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**


*NORTHING (ft): **184778.57** *EASTING (ft): **2622541.31**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **5** BOREHOLE DEPTH (ft): **6**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SP-SM	grey SILT and fine SAND, damp		AOI5-BH-16-053-0-2			53.6	
2		SP	grey fine SAND, some silt, damp		-			184.3	
3									
4		SW	grey medium to fine SAND, little silt, trace medium gravel, wet [Sulfur dioxide = 0.3 ppm]		AOI5-BH-16-053-4-5			419.8	
5									5
6			End of boring at 6 ft bgs						
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									


PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-054	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/8/16	COMPLETED: 6/8/16	*NORTHING (ft): 184730.91	*EASTING (ft): 2622566.57
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 4	BOREHOLE DEPTH (ft): 5
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			FILL; top soil						
1		ML	grey SILT, damp [Sulfur dioxide = 1.9 ppm]		AOI5-BH-16-054-0-2			587	
2			[Sulfur dioxide = 2.1 ppm]						
3					AOI5-BH-16-054-2-4			574.9	
4		SP-SM	dark grey SILT and grey to white coarse SAND, black staining, hard, wet		-			223.9	
5			End of boring at 5 ft bgs						5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-055	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 183666.15 *EASTING (ft): 2623163.05	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA *TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 2	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing CHECKED BY: A. Patel	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			dark grey to brown silt and fine sand, cinders, staining, dry		AOI5-BH-16 -055-0-2			129.3	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									




PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-056	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/7/16	COMPLETED: 6/7/16	*NORTHING (ft): 183601.59	*EASTING (ft): 2623218.11
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 4.5
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; dark brown silt and medium to fine sand, cinders, wood, staining, dry		AOI5-BH-16-056-0-2			108.8	
2			tar-like product observed at 2 ft [Hydrogen sulfide = 1.2 ppm; Sulfur dioxide = 1.2 ppm]						
3					AOI5-BH-16-056-2-4			6.8	
4					-			4.2	
5			End of boring at 4.5 ft bgs						5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-057	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/7/16	COMPLETED: 6/7/16	*NORTHING (ft): 184258.64	*EASTING (ft): 2622065.47
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 5	BOREHOLE DEPTH (ft): 8
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; brown to dark brown silt, wood, wet (surface water)		AOI5-BH-16-057-0-2			0	
2		ML	grey to dark grey SILT, wet (surface water)		-			0	
3									
4		CL-ML	grey blue CLAY and grey SILT; wet (surface water)		-			0	
5									5
6		CL	grey blue CLAY, transition to crumbly white to yellow clay, with medium to fine sand at 7 ft, tight, dry, possibly saturated at 5 ft						
7					AOI5-BH-16-057-7-8			0.8	
8			End of boring at 8 ft bgs						
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-058	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/7/16	COMPLETED: 6/7/16	*NORTHING (ft): 184111.05	*EASTING (ft): 2622021.78
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 8	BOREHOLE DEPTH (ft): 8
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	SILT, grey to dark grey to brown, moist, trace to some fine sand from 2 to 8 ft, wet at 8 ft		AOI5-BH-16-058-0-2			29.5	
2									
3					AOI5-BH-16-058-3-4			34.3	
4									
5					-			16.3	5
6									
7					-			0.8	
8									
9			End of boring at 8 ft bgs						
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-059	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/7/16	COMPLETED: 6/7/16	*NORTHING (ft): 184136.85	*EASTING (ft): 2621955.58
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 10
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; brown to light brown silt, bricks, gravel, cinders, damp		AOI5-BH-16 -059-0-2			0	
2									
3					-			0	
4									
5					-			0	5
6									
7		ML	light brown to grey SILT, moist		-			6.9	
8									
9					AOI5-BH-16 -059-8-10			12	
10			End of boring at 10 ft bgs						10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-16-060**

DRILLING: STARTED **6/7/16** COMPLETED: **6/7/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **184137.02** *EASTING (ft): **2621878.33**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **Not Encountered** BOREHOLE DEPTH (ft): **10**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	grey brown SILT, dry		AOI5-BH-16-060-0-2			1.3	
2		ML	dark brown to grey SILT, trace fine sand from 2 to 4 ft and 6 to 8 ft, damp		-			170	
3					-				
4					-				
5					-		476.2	5	
6					-				
7			-			55.6			
8		SP	brown to dark brown fine SAND, some silt, moist		AOI5-BH-16-060-8-10			484.5	
9									
10			End of boring at 10 ft bgs						10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-061**

DRILLING: STARTED **6/7/16** COMPLETED: **6/7/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**


*NORTHING (ft): **184047.29** *EASTING (ft): **2621865.93**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **10** BOREHOLE DEPTH (ft): **11**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**











*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	red brown to brown SILT, trace to little fine sand from 6 to 9 ft, dry		AOI5-BH-16-061-0-2			0	
2									
3						-		0	
4									
5						-		0	5
6									
7						-		0	
8						-		0	
9		SP	grey fine SAND, some to little silt, moist		-		0		
10								0	10
11						AOI5-BH-16-061-10-11		3.7	
12			End of boring at 11 ft bgs						
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-062	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/6/16	COMPLETED: 6/6/16	*NORTHING (ft): 183778.09	*EASTING (ft): 2621901.35
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 4	BOREHOLE DEPTH (ft): 8
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL: dark grey silt and fine sand, trace of brown coloring, trace cinders, damp		AOI5-BH-16-062-0-2			67	
2		ML-CL	grey to brown SILT, little to some clay from 4 to 8 ft, damp		-			0.3	
3					-				
4			wet (possibly perched)		-			1.3	5
5					-			2.2	
6					-			7.5	
7			staining at 7 ft		AOI5-BH-16-062-7-8				
8			End of boring at 8 ft bgs						
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-063	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/6/16	COMPLETED: 6/6/16	*NORTHING (ft): 183798.17	*EASTING (ft): 2621809.85
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 9	BOREHOLE DEPTH (ft): 9
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SP-SM	dark grey SILT and fine SAND, some black medium gravel, moist		AOI5-BH-16-063-0-2			21.4	
2		ML-CL	brown SILT, some clay, slight staining, damp		-			89.1	
3					-			112.2	5
4					-				
5					-				
6		SP-SM	brown fine SAND and SILT, moist		AOI5-BH-16-063-6-8			303.8	
7					-			113	
8		SP	brown fine SAND, some dark brown silt, moist		-				
9			End of boring at 9 ft bgs						
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:







PAGE 1 OF 1 **AOI5-BH-16-064**

DRILLING: STARTED **6/6/16** COMPLETED: **6/6/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**

*NORTHING (ft): **183691.9** *EASTING (ft): **2621816.34**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **Not Encountered** BOREHOLE DEPTH (ft): **10**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	
1		CL- ML	brown SILT and CLAY, damp		AOI5-BH-16 -064-0-2			0		
2		ML	light grey to brown to red-brown SILT, damp, black staining at 8 ft							
3		ML			-			2.8		
4										
5					-			20.6		5
6										
7					-			264.1		
8										
9					AOI5-BH-16 -064-8-10			580.8		
10										10
11		End of boring at 10 ft bgs								
12										
13										
14										
15	15									
16										
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:

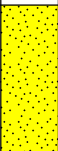






PAGE 1 OF 1 **AOI5-BH-16-065**





DRILLING: STARTED **6/16/16** COMPLETED: **6/16/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**


*NORTHING (ft): **182798.89** *EASTING (ft): **2622116.42**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **Not Encountered** BOREHOLE DEPTH (ft): **6**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**









*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SP	brown fine SAND, little silt, damp Encountered concrete slab at 2 ft		AOI5-BH-16 -065-0-2			0	
2		ML	dark grey SILT, firm, some brown fine sand, dry		-				
3	-								
4			FILL; brown fine sand, bricks, cinders, glass, black staining, dry Encountered concrete slab at 6 ft		AOI5-BH-16 -065-4-5			0	5
5					-				
6			End of boring at 6 ft bgs					3.5	
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									






PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-066	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/6/16	COMPLETED: 6/6/16	*NORTHING (ft): 183021.11 *EASTING (ft): 2620493.46	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA *TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 8	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing CHECKED BY: A. Patel	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	grey SILT, little brown fine sand, possible staining, dry		AOI5-BH-16-066-0-2			15.8	
2		SP-SM	grey SILT and fine SAND, wet (surface water)		-			9.3	
3									
4		SW	grey medium to fine SAND, some silt, wet (surface water)		-			36.5	5
5									
6		SW-SM	grey SILT and brown medium to fine SAND, black staining, moist		AOI5-BH-16-066-6-8			64.5	
7									
8			End of boring at 8 ft bgs						
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									




PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-067	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/6/16	COMPLETED: 6/6/16	*NORTHING (ft): 182974.76	*EASTING (ft): 2620476.91
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 9.5	BOREHOLE DEPTH (ft): 10
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	dark brown to brown SILT, some medium to fine sand, some black staining, slightly damp		AOI5-BH-16 -067-0-2			2.3	
2									
3									
4									
5									
6		SP	dark grey medium sand, little silt, moist		-			94.8	
7									
8									
9		SW	dark grey to brown, medium to fine SAND, some silt, little clay, clay is slightly stained, damp		AOI5-BH-16 -067-8-10			56.3	5
10									
11			wet at 9.5 ft End of boring at 10 ft bgs					124.8	10
12									
13									
14									
15									
16									
17									
18									
19									

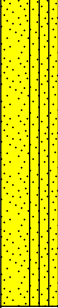

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-068	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/6/16	COMPLETED: 6/6/16	*NORTHING (ft): 182950.9	*EASTING (ft): 2620517.61
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 8	BOREHOLE DEPTH (ft): 8
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SP-SM	brown to dark grey fine SAND and SILT, moist		AOI5-BH-16-068-0-2			31.5	
2					-			24.6	
3					-			18.9	5
4			black staining of silt at 4 ft		-				
5					-				
6		SW	brown to dark grey, medium to fine SAND, some silt, moist		AOI5-BH-16-068-6-8			39.9	
7									
8			End of boring at 8 ft bgs						
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-069		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 6/10/16	COMPLETED: 6/10/16	*NORTHING (ft): 182244.24	*EASTING (ft): 2621330.92	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 8	BOREHOLE DEPTH (ft): 10	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; brown to dark grey silt, little fine sand, brick fragments, damp		AOI5-BH-16-069-0-2			0	
2		ML	brown to dark grey SILT, little clay from 4 to 6 ft, moist		-			2.7	
3					-			4.8	5
4					-			0	
5					-				
6					-				
7					-				
8		CL	grey CLAY, some silt, wet		AOI5-BH-16-069-8-10			6.1	
9									
10			End of boring at 10 ft bgs						10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-070	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/10/16	COMPLETED: 6/10/16	*NORTHING (ft): 182096.7	*EASTING (ft): 2621416.54
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 2	BOREHOLE DEPTH (ft): 4
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SP-SM	brown fine SAND and dark brown SILT, damp		AOI5-BH-16-070-0-2			0.5	
2			wet at 2 ft						▽
3					AOI5-BH-16-070-2-4			3.6	
4			End of boring at 4 ft bgs						
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5 Characterization**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-16-071**

DRILLING: STARTED **6/10/16** COMPLETED: **6/10/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe Bucket**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe Bucket**


*NORTHING (ft): **182283.99** *EASTING (ft): **2621412.88**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **2** BOREHOLE DEPTH (ft): **6**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**


*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; dark grey silt, some fine sand, damp		AOI5-BH-16-071-0-2			9.1	
2		ML	dark grey to brown SILT, damp						
3					AOI5-BH-16-071-2-4			64.3	
4									
5					-			0	5
6			End of boring at 6 ft bgs						
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									




PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-072	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/10/16	COMPLETED: 6/10/16	*NORTHING (ft): 182184.59	*EASTING (ft): 2621526.01
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 2	BOREHOLE DEPTH (ft): 3
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	brown to dark brown SILT, trace fine sand, trace small gravel, moist		AOI5-BH-16 -072-0-2			1.1	
2		SP	brown to dark brown fine SAND, some silt, little small gravel, wet		AOI5-BH-16 -072-2-3			1.5	
3			End of boring at 3 ft bgs						
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									



PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-073	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/10/16	COMPLETED: 6/10/16	*NORTHING (ft): 182315.12	*EASTING (ft): 2621513.38
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 3
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; dark brown silt, little fine sand, brick and gravel, wet		AOI5-BH-16-073-0-2			5.8	
2									
3					AOI5-BH-16-073-2-3			6.9	
4			End of boring at 3 ft bgs						
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-074	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/10/16	COMPLETED: 6/10/16	*NORTHING (ft): 182256.31	*EASTING (ft): 2621558.47
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 8
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	dark brown SILT, trace fine sand, moist		AOI5-BH-16 -074-0-2			9.8	
2					-			1.5	
3					-			14.6	5
4					-			21.8	
5					AOI5-BH-16 -074-6-8				
6					-				
7					-				
8					-				
8			End of boring at 8 ft bgs						
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									


PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-075	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/10/16	COMPLETED: 6/10/16	*NORTHING (ft): 182363.04	*EASTING (ft): 2621581.7
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 5
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	dark brown to dark grey SILT, trace fine sand from 0 to 2 ft and 4 to 5 ft, some medium gravel from 4 to 5 ft, wet [sulfur dioxide: 0.5 ppm (2-4 ft), 0.4 ppm (4-5 ft)]		AOI5-BH-16-075-0-2			47.9	
2									
3					-			88.8	
4					AOI5-BH-16-075-4-5			108.2	
5									5
6			End of boring at 5 ft bgs						
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-076	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 182159.14	*EASTING (ft): 2621990.52
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 2	BOREHOLE DEPTH (ft): 3
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; dark brown to dark grey silt and fine sand, stones, moist		AOI5-BH-16 -076-0-2			16.5	
2		ML	dark brown to dark grey SILT, staining, wet		AOI5-BH-16 -076-2-3			61.7	
3			End of boring at 3 ft bgs						
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-077	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 182177.24 *EASTING (ft): 2622088.67	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA *TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 4	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing CHECKED BY: A. Patel	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; dark brown silt, stone, cinders, brick, wood fragments, wet		AOI5-BH-16 -077-0-2			9.3	
2									
3					AOI5-BH-16 -077-2-4			21.5	
4			End of boring at 4 ft bgs						
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									


PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-078	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 182009.16	*EASTING (ft): 2621958.28
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 3
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL: grey to brown fine sand, some silt, cinders, dry		AOI5-BH-16 -078-0-2			2.9	
2		ML	dark brown SILT, some fine sand, wet						
3			End of boring at 3 ft bgs		AOI5-BH-16 -078-2-3			47.7	
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									


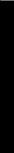





PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-079	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 181824.6	*EASTING (ft): 2622198.98
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): 6	BOREHOLE DEPTH (ft): 8
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	dark brown to dark grey SILT, some to trave fine sand from 2 to 4 ft and 6 to 8 ft, staining from 2 to 4 ft, wood debris from 2 to 4 ft, moist		AOI5-BH-16-079-0-2			58	
2									
3					-			7.5	
4									
5					AOI5-BH-16-079-4-5			9.8	5
6			wet at 6 ft						▽
7					-			0.2	
8			End of boring at 8 ft bgs						
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									


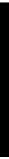
PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-080	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 6/9/16	COMPLETED: 6/9/16	*NORTHING (ft): 181680.74 *EASTING (ft): 2622178.63	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA *TOC ELEV (ft): NA	
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 3	
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA	
DRILLING METHOD:		WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA	
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing CHECKED BY: A. Patel	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			silt and fine sand to clay, rocks, cinders, wet		AOI5-BH-16-080-0-2			0	
2									
3					AOI5-BH-16-080-2-3			1.8	
4			End of boring at 3 ft bgs						
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-081		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 6/17/16	COMPLETED: 6/17/16	*NORTHING (ft): 181786.57 *EASTING (ft): 2622360.46		
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA *TOC ELEV (ft): NA		
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 12		
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA		
DRILLING METHOD:		WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA		
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: D. Downing CHECKED BY: A. Patel		
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; gravel with coarse sand, pebbles, cobbles, brown-grey, odor, pieces of liner from 3 to 4 ft, pockets of clay from 4 to 5 ft, dry		AOI5-BH-16 -081-0-2			5	5
2					-			1	
3					-			2	
4					AOI5-BH-16 -081-4-5			4	
5					-			1	
6			FILL; gravel with clay and sand, brown-grey, clay content increasing with depth, pottery pieces from 6 to 7 ft, dry		-			1	10
7					-			1	
8					-			0	
9					-			0	
10					-			0	
11		CL	brown to slightly orange CLAY, little silt, dry to becomes moist from 10 to 12 ft		-			0	15
12					-			0	
13					-				
14					-				
15					-				
16			End of boring at 12 ft bgs						
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-082		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 12/9/16	COMPLETED: 12/9/16	*NORTHING (ft): 182304.57 *EASTING (ft): 2621500.25		
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA *TOC ELEV (ft): NA		
DRILLING COMPANY: Stantec		INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 2		
DRILLING EQUIPMENT: Hand Auger		STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA		
DRILLING METHOD:		WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA		
SAMPLING EQUIPMENT: Hand Auger		LOGGED BY: K. McCorry CHECKED BY: A. Patel		
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		CL	gray CLAY		AOI5-BH-16 -082-0-2			0.3	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-083		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 12/9/16	COMPLETED: 12/9/16	*NORTHING (ft): 182458.21		*EASTING (ft): 2621610.49
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA		*TOC ELEV (ft): NA
DRILLING COMPANY: Stantec		INITIAL DTW (ft): Not Measured		BOREHOLE DEPTH (ft): 2
DRILLING EQUIPMENT: Hand Auger		STATIC DTW (ft): Not Measured		WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA		BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Hand Auger		LOGGED BY: K. McCorry		CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		CL	gray CLAY		AOI5-BH-16 -083-0-2			1.6	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-084	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 12/9/16	COMPLETED: 12/9/16	*NORTHING (ft): 182387.9	*EASTING (ft): 2621603.55
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Stantec		INITIAL DTW (ft): Not Measured	BOREHOLE DEPTH (ft): 2
DRILLING EQUIPMENT: Hand Auger		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Hand Auger		LOGGED BY: K. McCorry	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		CL	gray CLAY		AOI5-BH-16 -084-0-2			12.6	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									



PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-085	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 12/9/16	COMPLETED: 12/9/16	*NORTHING (ft): 182322.79	*EASTING (ft): 2621594
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Stantec		INITIAL DTW (ft): Not Measured	BOREHOLE DEPTH (ft): 2
DRILLING EQUIPMENT: Hand Auger		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Hand Auger		LOGGED BY: K. McCorry	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		CL	brown gray CLAY		AOI5-BH-16-085-0-2			0.9	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-16-086	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 12/9/16	COMPLETED: 12/9/16	*NORTHING (ft): 181963.42	*EASTING (ft): 2621707.71
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Stantec		INITIAL DTW (ft): Not Measured	BOREHOLE DEPTH (ft): 2
DRILLING EQUIPMENT: Hand Auger		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Hand Auger		LOGGED BY: K. McCorry	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		SM	brown silty SAND		AOI5-BH-16-086-0-2			5.6	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-17-01		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 3/22/17	COMPLETED: 3/22/17	*NORTHING (ft): 184161.06 *EASTING (ft): 2622773.09		
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA *TOC ELEV (ft): NA		
DRILLING COMPANY: Stantec		INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 2		
DRILLING EQUIPMENT: Hand Auger		STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA		
DRILLING METHOD:		WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA		
SAMPLING EQUIPMENT: Hand Auger		LOGGED BY: D. Hopkins CHECKED BY: A. Patel		
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	light brown SILT, with little fine sand		AOI5-BH-17-01			0	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
LOCATION: **AOI 5 Characterization**
PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1 **AOI5-BH-17-02**

DRILLING: STARTED **3/22/17** COMPLETED: **3/22/17**
INSTALLATION: STARTED COMPLETED:
DRILLING COMPANY: **Stantec**
DRILLING EQUIPMENT: **Hand Auger**
DRILLING METHOD:
SAMPLING EQUIPMENT: **Hand Auger**

*NORTHING (ft): **184362.62** *EASTING (ft): **2622632.46**
*GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
INITIAL DTW (ft): **Not Measured** BOREHOLE DEPTH (ft): **2**
STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
LOGGED BY: **D. Hopkins** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	dark brown SILT, organic matter and fine gravel		AOI5-BH-17-02			0	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
LOCATION: **AOI 5 Characterization**
PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-17-03**

DRILLING: STARTED **3/22/17** COMPLETED: **3/22/17**
INSTALLATION: STARTED COMPLETED:
DRILLING COMPANY: **Stantec**
DRILLING EQUIPMENT: **Hand Auger**
DRILLING METHOD:
SAMPLING EQUIPMENT: **Hand Auger**


*NORTHING (ft): **183987.62** *EASTING (ft): **2622539.76**
*GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA**
INITIAL DTW (ft): **Not Encountered** BOREHOLE DEPTH (ft): **2**
STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): **NA**
LOGGED BY: **D. Hopkins** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	light brown SILT, with little fine sand		AOI5-BH-17-03			0	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-17-04	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 3/22/17	COMPLETED: 3/22/17	*NORTHING (ft): 184311.58	*EASTING (ft): 2622399.13
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Stantec		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 2
DRILLING EQUIPMENT: Hand Auger		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Hand Auger		LOGGED BY: D. Hopkins	CHECKED BY: A. Patel
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1		ML	light to dark brown SILT, with little fine sand and clay		AOI5-BH-17-04			0	
2			End of boring at 2 ft bgs						
3									
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex LOCATION: AOI 5 PROJECT NUMBER: 213402567	WELL / PROBEHOLE / BOREHOLE NO: 
DRILLING: STARTED 4/17/17 COMPLETED: 4/18/17 INSTALLATION: STARTED COMPLETED: DRILLING COMPANY: Parratt Wolff DRILLING EQUIPMENT: Truck-Mounted CME-75 DRILLING METHOD: HSA SAMPLING EQUIPMENT: Backhoe Bucket/Split Spoon	PAGE 1 OF 1 AOI5-BH-17-05 *NORTHING (ft): 184200 *EASTING (ft): 2623166 *GROUND ELEV (ft): 9.7 *TOC ELEV (ft): NA INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 20 STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA WELL CASING DIAMETER (in): --- BOREHOLE DIAMETER (in): 6 LOGGED BY: ADK CHECKED BY: JKD *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			APPARENT FILL [crushed stone, bricks, cobbles, gravel, and debris (saturated at 2' bgs; apparent perched water; sheen observed)]					0.0	
2									
3									
4		CL	Brownish gray (stained greenish gray and black) CLAY/SILT, trace very fine sand, trace coarse to fine gravel (laminated appearance) (some organic material; roots) (wet to saturated; NAPL observed around soil peds)					0.0	5
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		SP	SAME (brownish gray with common reddish yellow mottles) (slightly micaceous) (trace organic material) (moist)			1.8	2 7 7 8	0.0	10
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26			LOCATION CLEARED TO 8 FT BELOW GROUND SURFACE VIA BACKHOE. SWITCH TO HOLLOW STEM AUGERS.					0.0	15
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37			SAME (wet to saturated)			1.7	1 3 4 4	3.4	10
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48			SAME (many reddish yellow mottles) (finely laminated with micaceous silt and very fine sand) (moist to wet)			1.1	3 5 7 8	0.0	15
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59			SAME (reddish yellow and slightly cemented) (moist)			1.5	WOH 2 2 3	0.0	15
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
70			Light gray and white medium to coarse to fine SAND, trace to little pebbles, trace silt (slightly glauconitic) (sand fraction is multicolored) (coarse gravel in drive shoe) (saturated)			1.4	3 4 15 30	2.7	10
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81			WEATHERED BEDROCK [varicolored clay/silt, little fine sand (micaceous) (moist) (fabric preserved)]			1.3	2 3 5 4	0.0	20
82									
83									
84									
85									
86									
87									
88									
89									
90									
91									
92			*Boring terminated at 20 ft below ground surface*						25
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:




PAGE 1 OF 1 **AOI5-BH-17-06**













DRILLING: STARTED **4/17/17** COMPLETED: **4/18/17**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Parratt Wolff**
 DRILLING EQUIPMENT: **Truck-Mounted CME-75**
 DRILLING METHOD: **HSA**
 SAMPLING EQUIPMENT: **Backhoe Bucket/Split Spoon**


*NORTHING (ft): **183967** *EASTING (ft): **2623289**
 *GROUND ELEV (ft): **10** *TOC ELEV (ft): **NA**
 INITIAL DTW (ft): **Not Measured** BOREHOLE DEPTH (ft): **22**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA**
 WELL CASING DIAMETER (in): **---** BOREHOLE DIAMETER (in): **6**
 LOGGED BY: **ADK** CHECKED BY: **JKD**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			APPARENT FILL [crushed stone, bricks, cobbles, some silty gravel and sand (dry)]						
2								0.0	
3			SAME (clay/silt mixed with gravel, few cobbles, bricks) (wet; perched water seepage from gravelly zones)						
4								0.0	
5									5
6		CL	Brownish gray and black CLAY/SILT, some coarse to fine gravel, little fine sand (common pale olive mottles) (some organic material; roots and thin peat layers) (coarse blocky to massive structure) (wet; NAPL globules and sheen present on seeping water)					0.0	
7			LOCATION CLEARED TO 8 FT BELOW GROUND SURFACE VIA BACKHOE. SWITCH TO HOLLOW STEM AUGERS.						
8			NO RECOVERY						
9						0.1	5 2 3 9	0.1	
10			SAME (mottles are yellowish brown) (color change to brown at 11' +/-) (saturated)				WOH		10
11						1.1	1 2 1	0.1	
12		OL	Dark brown CLAY/SILT, and to some organic material (wet to saturated)					0.1	
13			PEAT LAYER			0.9	WOH/1 2 2	0.0	
14		SM	Light gray very fine to fine SAND, trace clay (trace to little lignite) (wet to saturated)				1 2 4 5	0.0	15
15						1.3			
16			SAME (coarser than above; few lenses of medium sand, trace silt) (few thin peat layers) (change in drive shoe to reddish yellow coarser sand) (saturated)				3 1 1 2	0.0	
17						1.4			
18		SW-SM	Reddish yellow and reddish brown coarse to fine SAND, some coarse gravel (sub-rounded sandstone), trace pebbles, trace silt (saturated)				2 14 17 14	1.0	
19						1.0			
20		SM	Reddish yellow very fine to fine SAND, little to some silt, trace fine gravel (micaceous) (wet)				4 12 29	0.0	20
21		GM	Coarse GRAVEL (wet)			1.1		0.0	
22			WEATHERED BEDROCK [varicolored fine to medium sand, trace silt/clay (micaceous) (moist) (fabric preserved)]				50/2"	0.0	
23			*Spoon refusal encountered at 22 ft below ground surface*						
24									
25									25
26									
27									
28									
29									

















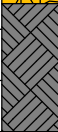

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5		PAGE 1 OF 1 AOI5-BH-17-07		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 4/17/17	COMPLETED: 4/19/17	*NORTHING (ft): 183663	*EASTING (ft): 2623374	
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): 9.1	*TOC ELEV (ft): NA	
DRILLING COMPANY: Parratt Wolff		INITIAL DTW (ft): Not Measured	BOREHOLE DEPTH (ft): 30	
DRILLING EQUIPMENT: Truck-Mounted CME-75		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA	
DRILLING METHOD: HSA		WELL CASING DIAMETER (in): ---	BOREHOLE DIAMETER (in): 6	
SAMPLING EQUIPMENT: Backhoe Bucket/Split Spoon		LOGGED BY: ADK	CHECKED BY: JKD	
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			APPARENT FILL [crushed stone, bricks, wood, concrete, cobbles, some black acid sludge mixed with sandy clay/silt matrix (dry to wet; few NAPL seeps and globules)]						
2									
3			*Samples collected for acid sludge determination at 3 ft and 4-5 ft*		AOI5-BH-17-07 3'				
4					AOI5-BH-17-07 4-5'				
5									5
6			LOCATION CLEARED TO 8 FT BELOW GROUND SURFACE VIA BACKHOE. SWITCH TO HOLLOW STEM AUGERS.						
7									
8			SAME (black color) (*sample collected for acid sludge determination*) (wet to saturated) (SO2 = 1.9 ppm)		AOI5-BH-17-07 8-10'				
9									
10									
11		CL	Brownish gray CLAY/SILT (some organic material; roots and thin peat layers, leaf mats) (moist to wet) (SO2 = 0.1 ppm)						
12									
13		CL	Light gray CLAY/SILT, little very fine sand, trace fine sand (micaceous) (few faint dark greenish gray mottles) (moist to damp) (SO2 = 0.2 ppm)						
14									
15			SAME (light gray with light greenish gray laminations) (trace pebbles) (intensely mottled) (trace gravel with depth) (moist to damp) (SO2 = 0.4 ppm)						
16		GW-GM	SAME (some coarse to medium gravel) (gravel lodged in drive shoe) (damp)						
17									
18			Gray fine to coarse GRAVEL and coarse to fine SAND, little silt (gravels are heterogeneous and varicolored; some in-situ weathering of gravels apparent) (saturated to wet)						
19									
20									
21		SM	Interbedded yellowish brown fine to coarse GRAVEL and olive brown fine SAND, little to some silt (0.5' beds) (saturated) (SO2 = 0.2 ppm)						
22									
23			SAME (0.4-0.5' beds) (coarsening upward sequences) (micaceous) (saturated to wet)						
24									
25			SAME (coarse gravel) (saturated)						
26			SAME (saturated)						
27									
28			SAME (wet)						
29			WEATHERED BEDROCK [green and black fine to medium sand, some silt/clay (micaceous) (moist) (fabric preserved)]						
30									
			Boring terminated at 30 ft below ground surface						



PROJECT: Marcus Hook Industrial Complex	WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5	PAGE 1 OF 1 AOI5-BH-17-08	
PROJECT NUMBER: 213402567		
DRILLING: STARTED 4/17/17 COMPLETED: 4/19/17	*NORTHING (ft): 183585	*EASTING (ft): 2623539
INSTALLATION: STARTED COMPLETED:	*GROUND ELEV (ft): 6.9	*TOC ELEV (ft): NA
DRILLING COMPANY: Parratt Wolff	INITIAL DTW (ft): Not Measured	BOREHOLE DEPTH (ft): 24
DRILLING EQUIPMENT: Truck-Mounted CME-75	STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD: HSA	WELL CASING DIAMETER (in): ---	BOREHOLE DIAMETER (in): 6
SAMPLING EQUIPMENT: Backhoe Bucket/Split Spoon	LOGGED BY: ADK	CHECKED BY: JKD
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88		


[illegible]


PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:		
LOCATION: AOI 5		PAGE 1 OF 1 AOI5-BH-17-09		
PROJECT NUMBER: 213402567				
DRILLING: STARTED 4/20/17	COMPLETED: 4/20/17	*NORTHING (ft): 183343		*EASTING (ft): 2623240
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): 6.2		*TOC ELEV (ft): NA
DRILLING COMPANY: Parratt Wolff		INITIAL DTW (ft): Not Measured		BOREHOLE DEPTH (ft): 28
DRILLING EQUIPMENT: Truck-Mounted CME-75		STATIC DTW (ft): Not Measured		WELL DEPTH (ft): NA
DRILLING METHOD: HSA		WELL CASING DIAMETER (in): ---		BOREHOLE DIAMETER (in): 6
SAMPLING EQUIPMENT: Backhoe Bucket/Split Spoon		LOGGED BY: ADK		CHECKED BY: JKD
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88				


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)		
1			APPARENT FILL [silt/clay mixed with debris, crushed stone, fabric, bricks, wood, concrete, rebar, pipes, and cobbles] (moist to wet)]		AOI5-BH-17-09 4-5'						
2										0.1	
3											
4			*Sample collected for acid sludge determination at 4-5 ft*								
5										0.1	5
6			LOCATION CLEARED TO 8 FT BELOW GROUND SURFACE VIA BACKHOE. SWITCH TO HOLLOW STEM AUGERS.								
7										0.1	
8			SAME (large brick fragment, black fill in drive shoe) (wet)								
9											
10		SAME (brick fragments with black sandy clay/silt, trace medium gravel) (wet)									
11			0.4	1 2 2 5	16						
12		CL	Black CLAY/SILT, trace fine sand (some to and organic material; roots and leaf mats (change in drive shoe to light gray clay/silt) (wet to saturated; NAPL apparent)			1.5	1 1 1 2	144			
13											
14		CL	Pale green and light gray CLAY/SILT, trace fine sand (micaceous) (laminated appearance) (few pebbles) (few coarse sand laminations with depth) (change in drive shoe to gravel) (moist)			1.2	4 4 5 16	2.2	15		
15											
16		GW-GM	Yellowish brown coarse to fine GRAVEL, some to little fine to coarse sand, little to trace silt (slightly micaceous) (gravels are heterogeneous; quartz, red sandstone, mudstone weathered in-situ) (moist)			1.2	18 17 36 48	0.0			
17											
18			SAME (slightly glauconitic) (less gravel than above) (saturated)			1.6	20 24 14 8	0.1			
19											
20		CL	Reddish yellow (oxidized horizon) to light gray CLAY/SILT, trace very fine sand, trace fine gravel (slightly micaceous) (few black mottles) (laminated appearance) (damp)			1.4	2 5 6 8	0.0	20		
21			SAME (pinkish gray color) (grades with depth to very fine sand, some clay/silt) (moist)								
22		SC	Olive brown very fine SAND, some clay/silt (slightly glauconitic) (micaceous) (saturated to wet)			0.5	4 9 31 38	0.0			
23											
24		GM	Brownish yellow and olive brown coarse to medium GRAVEL, some fine to coarse sand, little silt/clay) (coarsely micaceous) (gravels are heterogeneous red sandstone, mudstone, quartz) (wet to moist)			0.6	11 17 50/3"	0.0	25		
25											
26			WEATHERED BEDROCK [slightly weathered felsic gneiss with garnets (fabric preserved)]			0.1	50/1"	0.0			
27											
28			*Spoon refusal encountered at 26 ft below ground surface*								
29											



PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-17-010	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 4/20/16	COMPLETED: 4/20/16	*NORTHING (ft): 183566.85	*EASTING (ft): 2622992.42
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 3
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: A. Patel	CHECKED BY: J. DeBoer
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			


Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; chert gravel, with some brown clayey sand, no odor, dry		AOI5-BH-17 -010-1-2			0	
2			water begins filling in hole at 2 ft						
3			End of boring at 3 ft bgs						
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									


PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-17-011	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 4/20/16	COMPLETED: 4/20/16	*NORTHING (ft): 183546.32	*EASTING (ft): 2622960.89
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 3
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: A. Patel	CHECKED BY: J. DeBoer
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; chert gravel, with some brown sand and clay, no odor, dry		AOI5-BH-17 -011-1-2			1	
2			water begins filling in hole at 2 ft						
3			at 3 ft: clayey chert gravel with black staining, some odor, NAPL observed End of boring at 3 ft bgs						
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-17-012	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 4/20/16	COMPLETED: 4/20/16	*NORTHING (ft): 183503.05	*EASTING (ft): 2622887.55
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 3
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: A. Patel	CHECKED BY: J. DeBoer
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; grey chert gravel, with brown sand and some clay, no odor, dry		AOI5-BH-17 -012-1-2			7	
2			water begins filling in hole at 2 ft; black staining, some odor, NAPL observed						
3			End of boring at 3 ft bgs						
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: Marcus Hook Industrial Complex		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: AOI 5 Characterization		PAGE 1 OF 1 AOI5-BH-17-013	
PROJECT NUMBER: 213402567			
DRILLING: STARTED 4/20/16	COMPLETED: 4/20/16	*NORTHING (ft): 183486.18	*EASTING (ft): 2622861.15
INSTALLATION: STARTED	COMPLETED:	*GROUND ELEV (ft): NA	*TOC ELEV (ft): NA
DRILLING COMPANY: Sweeney		INITIAL DTW (ft): Not Encountered	BOREHOLE DEPTH (ft): 2
DRILLING EQUIPMENT: Backhoe Bucket		STATIC DTW (ft): Not Measured	WELL DEPTH (ft): NA
DRILLING METHOD:		WELL CASING DIAMETER (in): NA	BOREHOLE DIAMETER (in): NA
SAMPLING EQUIPMENT: Backhoe Bucket		LOGGED BY: A. Patel	CHECKED BY: J. DeBoer
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88			

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL: grey chert gravel, some brown sand, no odor, dry		AOI5-BH-17 -013-1.0			0	
2			water begins seeping in hole at 2 ft; black staining, residual NAPL observed						
3			End of boring at 2 ft bgs						
4									
5									5
6									
7									
8									
9									
10									10
11									
12									
13									
14									
15									15
16									
17									
18									
19									

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI-5, Tank 593**
 PROJECT NUMBER: **213402428**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1

MH593-1C

DRILLING: STARTED **6/24/15** COMPLETED: **6/24/15**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe**

NORTHING (ft): EASTING (ft):
 LATITUDE: LONGITUDE:
 GROUND ELEV (ft): TOC ELEV (ft):
 INITIAL DTW (ft): **Not Encountered** BOREHOLE DEPTH (ft): **12**
 STATIC DTW (ft): **Not Encountered** WELL DEPTH (ft):
 WELL CASING DIAMETER (in): --- BOREHOLE DIAMETER (in):
 LOGGED BY: **J. DeBoer** CHECKED BY: **J. Menges**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)
			Sand and gravel FILL						
			Dark gray sand, some gravel, moist FILL						
1			Orange CLAY with some gray mottling		--			0.0	
2					1110 MH593-1C (1.5)			0.0	
3					--			0.0	
4					--			0.0	
5					--			0.0	5
6					--			0.0	
7					--			0.0	
8					--			0.0	
9					--			0.0	
10					--			0.0	10
11					--			0.0	
12			End of boring 12' below ground surface		1115 MH593-1C (12.0)			0.0	
13					--				
14					--				

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI-5, Tank 593**
 PROJECT NUMBER: **213402428**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1

MH593-2C

DRILLING: STARTED **6/24/15** COMPLETED: **6/24/15**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Sweeney**
 DRILLING EQUIPMENT: **Backhoe**
 DRILLING METHOD:
 SAMPLING EQUIPMENT: **Backhoe**

NORTHING (ft): EASTING (ft):
 LATITUDE: LONGITUDE:
 GROUND ELEV (ft): TOC ELEV (ft):
 INITIAL DTW (ft): **Not Encountered** BOREHOLE DEPTH (ft): **8**
 STATIC DTW (ft): **Not Encountered** WELL DEPTH (ft):
 WELL CASING DIAMETER (in): --- BOREHOLE DIAMETER (in):
 LOGGED BY: **J. DeBoer** CHECKED BY: **J. Menges**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)
			Sand and gravel FILL						
			Dark gray, coarse SAND, little fine gravel, moist, dark gray at 1'						
1			Orange CLAY with some gray mottling.		--			6	
2					1145 MH593-2C (1.5)			3	
3					1155 MH593-2C (3.0)			19	
4					--			4	
5					--			6	5
6					--			1	
7					--			5	
8			End of boring 8' below ground surface						
9									
10									10
11									
12									
13									
14									

MW-44

Sym	Samp Lo	PIL (ppm)	Depth (Feet)	Geologic Description	Logging Well Piezometer	Design Specifications																																				
				0-2.0' BALLAST fill, with brown clay seams.		Elevations: 1 _____ 2 _____ (feet MSL) 3 _____ 4 _____ Coordinates: X _____ Y _____ Type of Casing: <input checked="" type="checkbox"/> PVC Sched. 40 Flush Thread <input type="checkbox"/> Stainless Steel <input type="checkbox"/> _____ Casing Diameter: <input type="checkbox"/> 2" <input type="checkbox"/> 3" <input checked="" type="checkbox"/> 4" <input type="checkbox"/> 6" <input type="checkbox"/> _____ Screen Slot: <input type="checkbox"/> 0.008 <input checked="" type="checkbox"/> 0.010 <input type="checkbox"/> _____ Screen Style: <input checked="" type="checkbox"/> Machine Slot <input type="checkbox"/> Wire Wrap <input type="checkbox"/> _____ Sand Pack: 20/40 Colorado Silica Sand _____ Bentonite Seal: <input type="checkbox"/> 1/2" Pellets <input type="checkbox"/> Hole Plug <input type="checkbox"/> Slurry <input type="checkbox"/> 1/4" Pellets <input checked="" type="checkbox"/> 3/8" Pellets _____ Grout Type: Portland Cement _____ Weight: _____ Bore Hole Diameter: 10" Drill Rig: <input checked="" type="checkbox"/> Hollow Stem <input type="checkbox"/> Rotary <input type="checkbox"/> _____ Drilled By: <u>Bl Myers</u> Logged By: <u>M. Sherrier</u> Completion Date: <u>2-15-91</u>																																				
				2.0-5.0' CLAY, dark gray, moist.																																						
			5	5.0-7.0' CLAYEY SAND, brown, moist, hydrocarbon and sulfur smell, oil-stained from 5.5' to 6.5'.																																						
	90			7.0-15.0' CLAY, gray to green, moist, hydrocarbon odor, green sand from 14.5' to 15.0'.																																						
			10																																							
				15.0-17.0' NR	3.0 4.0 5.0 16.5 17.5																																					
			15			<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>D-T-W</th> <th>MSL</th> <th>Date</th> <th>Field pH</th> <th>Field EC</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Date	D-T-W	MSL	Date	Field pH	Field EC																														
Date	D-T-W	MSL	Date	Field pH	Field EC																																					
	100					Comments: <u>Samples from 0-5', 7-14' taken from cuttings;</u> <u>samples from 5-7', 14-15' taken by SS method.</u> <u>Refusal at 17'.</u>																																				
			20			MP-6 SUN <small>Sun Building and Marking Company Marcus Hook Refinery</small> Project: 169090007 (MP6) Location: Marcus Hook, PA K.W. BROWN & ASSOCIATES, INC.																																				
				ST=Shelby Tube <input checked="" type="checkbox"/> SS=Split Spoon <input checked="" type="checkbox"/> C=Cuttings																																						

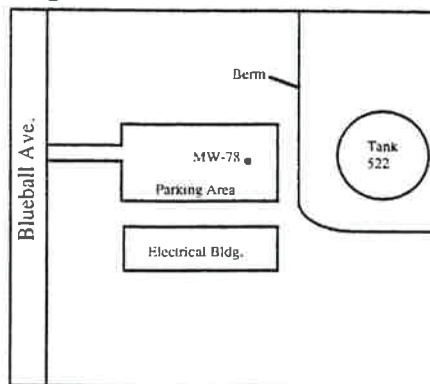
Depths in Feet
from Ground Surface
(Not to Scale)



Groundwater & Environmental Services, Inc.

Drilling Log

Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC.
 Location AST 522 Permit No. N/A
 Well number MW-78 Total Depth 20 feet Diameter 10 inches
 Casing Elevation 12.70 feet Water Level: Initial 9 feet Static 4.88 feet
 Screen Dia. 4 inches Length 15 feet Slot Size 0.02 inches
 Casing Dia. 4 inches Length 5 feet Type Stainless Steel
 Drilling Method Hollow Stem Auger Sample Method grab cuttings
 Completion Details flush mounted manhole
 Driller B.L. MYERS BROS., INC. Log By RDP Date 17 Sept. 1993



Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count	Lithology
			0		ASPHALT AND BALLAST
			130		SAND - Gray sand and gravel.
			288		SILT - Dark gray, sandy silt, moist, strong odor.
			100		- Dark gray silt, wet, strong odor.
					- Light grayish/brown sandy silt, wet.
5					Static Water Level 4.88 feet
			68		CLAY - Grayish/brown clay, wet, moderate odor
					ASPHALT/CONCRETE AND BALLAST
			22		SAND - Gray/brown silty sand Initial Water Level 9.0 feet
10					CLAY - Gray, sandy clay, wet.
			15		- Gray, sandy clay, wet.
15					- Gray clay, wet.
			2.0		
20					END BORING 20 feet

AOI-5

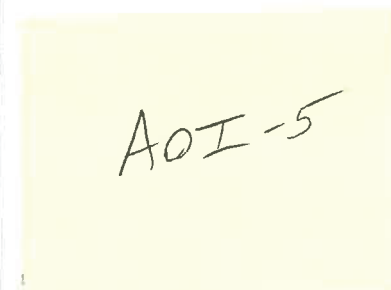


Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
 Location Marcus Hook, PA Permit No. N/A
 Boring number MW-83 Total Depth 19 ft. Diameter 10 inch
 Casing Elevation 20.26 ft Water Level: Initial 13 ft Static 12.45 ft
 Screen Dia. 4-inch Length 15 ft Slot Size 0.020 inch
 Casing Dia. 4-inch Length 4 ft Type PVC
 Drilling Method Hollow-Stem Auger Sample Method Split-Spoon
 Completion Details Protective iron riser with locking lid
 Driller B. L. Myers Bros., Inc. Log By E. Dziedzic Date 21 SEP 94

Sketch Map



See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
0.0					FILL - Brown sandy silt fill, crushed stone, dry
31					- Black crushed stone and pea gravel, dry
65					SILT - Black clayey silt, moist, odor
217	2,2,3,2			10"	- Grayish-brown clayey silt, moist
97	4,6,8,14			20"	CLAY - Brown silty clay with matrix supported pebbles, NAPL, moist
					Static Water Level -12.45 ft
					Initial Water Level -13 ft
					- Rough augering
446	50/6"			2"	SAND - Coarse sand, poorly sorted, wet, odor, rough augering
					- Rough augering
					- Auger refusal at 19 feet
20					BORING COMPLETED AT 19 FEET
25					
30					



Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun Marcus Hook Refinery Owner Sun Companv. Inc. (R&M)
Location Marcus Hook, PA Permit No. N/A
Boring number MW-84 Total Depth 8 ft. Diameter 10 in.
Casing Elevation 10.16 ft Water Level: Initial 5 ft Static 3.85 ft
Screen Dia. 4-inch Length 7 ft Slot Size 0.020 inch
Casing Dia. 4-inch Length 1 ft Type PVC
Drilling Method Hollow-Stem Auger Sample Method Split-Spoon
Completion Details Protective iron riser with locking lid
Driller B. L. Myers Bros., Inc. Log By E. Dziedzic Date 21 Sep 94

Sketch Map

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
			0.0		FILL - Ballast stone
			127		CLAY - Gray micaceous silty clay, moist
					▼ Static Water Level -3.85 ft
5	9,10,25,19		99	14"	▽ Initial Water Level- 5 ft.
					- Gray silty clay, moist (top)
					SAND - Brown medium sand with pebbles, wet
					- Rough augering
					- Auger refusal at 8 feet
					BORING COMPLETED AT 8 FEET
10					
15					
20					
25					
30					



Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
Location Marcus Hook, PA Permit No. N/A
Boring number MW-85 Total Depth 8 ft. Diameter 10 inch
Casing Elevation 11.98 ft Water Level: Initial 4 ft Static 5.74 ft
Screen Dia. 4-inch Length 7 ft Slot Size 0.020 inch
Casing Dia. 4-inch Length 1 ft Type PVC
Drilling Method Hollow-Stem Auger Sample Method Split-Spoon
Completion Details Protective iron riser with locking cap
Driller B. L. Myers Bros., Inc. Log By E. Dziedzic Date 21 SEP 94

Sketch Map

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
			0.0		TOP SOIL
			106		SILT - Brown clayey micaceous silt, dry - Dark brown-black clayey silt, moist
			196		▽ Initial Water Level -4 ft - Black clayey silt, wet, odor - Gray silt
5	2,3,4,11		10	10"	▼ Static Water Level -5.74 ft
					BORING COMPLETED AT 8 FEET
10					
15					
20					
25					
30					



Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
Location Marcus Hook, PA Permit No. N/A
Boring number MW-86 Total Depth 18 ft. Diameter 10 inch
Casing Elevation 14.68 ft Water Level: Initial 10 ft Static 2.09 ft
Screen Dia. 4-inch Length 16 ft Slot Size 0.020 inch
Casing Dia. 4-inch Length 2 ft Type PVC
Drilling Method Hollow-Stem Auger Sample Method Split-Spoon
Completion Details Protective iron riser with locking lid
Driller B. L. Myers Bros., Inc. Log By E. Dziedzic Date 21 SEP 94

Sketch Map

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
			0.0		TOP SOIL - Ballast stone, wet, standing water with sheen
			0.0		▼ Static Water Level- 2.09 ft
					CLAY - Brown clay, dry
5	9.9, 11, 23		0.0	7"	- Brown micaceous clay, dry, some small well-rounded pebbles
10	8.4, 3.4		0.0	6"	▼ Initial Water Level - 10 ft
					SAND - Coarse sand with small well-rounded pebbles, some fines, wet 2" saprolitic clay at bottom
15	14, 13, 14, 19		28		- Running sands, wet
	35/6"		17	3"	- Auger resistance-saprolite
					BORING COMPLETED AT 18 FEET
20					
25					
30					

MW-109



Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
 Location Marcus Hook, PA Permit No. NA
 Boring number SB-1/MW-109 Total Depth 16 FT. Diameter 10 in.
 Casing Elevation 15.32 ft. Water Level: Initial 10 ft. Static 5.67 ft.
 Screen Dia. 4 in. Length 4 ft. Slot Size 0.020 in.
 Casing Dia. 4 in. Length 12 ft. Type PVC
 Drilling Method Hollow Stem Auger Sample Method Split-Spoon
 Completion Details Protective stick up riser pipe with locking lid
 Driller Lutz Environmental Log By L. Leitzel Date 10 June 1995

Sketch Map

AOI-5

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
					FILL
					- No. 2 gravel and fill stone
5	2-2-2-9		365	0	CLAY
			65		- Gray clay, with some brown silt, moist, strong odors
					Static water at 5.67 feet
10	27-44-50/0"		1,400	15	- Cobbles, no recovery
					Initial water at 10 feet
					- Gray clay, moist, NAPL staining on the outside of the core, strong odors
15	50/2"		78	2	SAND
					- Gray medium grained sand, hard, moist to wet, strong odors
					- Gray medium grained sand, wet, strong odors
					- Schist at 16 feet
					BORING COMPLETED AT 16 FEET
20					
25					
30					



Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
 Location Phillips Island Permit No. N/A
 Boring number SB-3/ MW-113 Total Depth 20 ft. Diameter 10 in.
 Casing Elevation 11.46 Water Level: Initial Static 5.5 ft
 Screen Dia. 4-inch Length 15 ft Slot Size 0.020 inch
 Casing Dia. 4-inch Length 5 ft Type PVC
 Drilling Method Hollow Stem Auger Sample Method Split-Spoon
 Completion Details Protective Iron Riser with Locking Lid
 Driller Lutz Environmental Log By L. Leitzel Date 10 May 95

Sketch Map

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
					#1 BALLAST STONE
					CLAY - Brownish-tan silty clay, no odors, damp
5	3,3,6,16		2.5	24"	▼ Static water at 5.5 feet - Tannish-gray silty clay, damp
					- Gray clay, NAPL stained, slight odors
10	1,1,1,1		0.0	24"	- Tannish-gray (dark) silty clay, damp, some staining, slight odors
					SAND - Gray fine sand
15	6,3,3,3		0.0	24"	- Gray fine sand, wet, slight odors
					- Tan fine sand, trace clay, damp, no odors
20	2,6,7,6		0.0	24"	- Tan fine-grained sand and clay, some gray staining, no apparent odors
					BORING COMPLETED AT 20 FEET
25					
30					



Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
 Location Phillips Island Permit No. N/A
 Boring number SB-2/ MW-114 Total Depth 20 ft. Diameter 10 in.
 Casing Elevation 10.04 Water Level: Initial 15 ft Static 9 ft
 Screen Dia. 4-inch Length 15 ft Slot Size 0.020 inch
 Casing Dia. 4-inch Length 5 ft Type PVC
 Drilling Method Hollow Stem Auger Sample Method Split-Spoon
 Completion Details Protective Iron Riser with Locking Lid
 Driller Lutz Environmental Log By L. Leitzel Date 10 May 95

Sketch Map

AOI-6

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
					BALLAST STONE
					CLAY - Brown silty clay - Gray silty clay, damp, no odors - Tan clay with fine sand, moist - Medium gray clay, trace silt, damp, some staining, slight odors
5	3,4,5,6		7.6	24"	
					SILT ▼ Static water at 9 feet - Tan clayey silt
10	2,2,2,4		0.0	24"	- Tannish-gray clayey silt, damp, no odors
					▽ Initial water at 15 feet
15	2,4,3,3		0.0	22"	CLAY - Tannish-gray clay, wet, no odors, some staining - Tan micaceous clay, trace of fine sand, no odors
20	5,8,9,12		2.5	22"	- Tan micaceous clay, wet, no odors
					BORING COMPLETED AT 20 FEET
25					
30					



Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun: Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
Location Phillips Island Permit No. N/A
Boring number SB-9 /MW-115 Total Depth 30 ft. Diameter 10 in.
Casing Elevation 20.31 Water Level: Initial 14 ft Static 26 ft
Screen Dia. 4-inch Length 25 ft Slot Size 0.020 inch
Casing Dia. 4-inch Length 5 ft Type PVC
Drilling Method Hollow Stem Auger Sample Method Split-Spoon
Completion Details Protective Iron Riser with Locking Lid
Driller Lutz Environmental Log By RDP Date 25 June 95

Sketch Map

AOI-6

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
					SAND - Brown silty sand, no odors, moist
					CLAY - Gray silty clay, some sand, no odors, moist
5	8.7,6,6		0.0	12"	SILT - Brown gray sandy silt with pebbles, no odors, moist
10	8,8,6,7		0.0	15"	CLAY - Gray silty clay, some pebbles, moist, no odors - Some dark gray sandy silt at bottom of sample
15			0.0		▽ Initial water at 14 feet - Dark gray silty clay, wet, no odors
20	18,16,22,26		0.0	3"	- Gray silty clay with some sand, wet, no odors
25					▼ Static water at 26 feet
30					BORING COMPLETED AT 30 FEET

Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun: Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
 Location Phillips Island Permit No. N/A
 Boring number SB-8/MW-116 Total Depth 30 ft. Diameter 10 in.
 Casing Elevation 21.38 Water Level: Initial 16 ft Static 30 ft
 Screen Dia. 4-inch Length 25 ft Slot Size 0.020 inch
 Casing Dia. 4-inch Length 5 ft Type PVC
 Drilling Method Hollow Stem Auger Sample Method Split-Spoon
 Completion Details Protective Iron Riser with Locking Lid
 Driller Lutz Environmental Log By RDP Date 25 June 95

Sketch Map



See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
					SILT - Brown silt and sand
					CLAY - Gray silty clay
5	6,7,9,8		0.0	12"	- Dark gray silt clay, some sand, wet, no odors
10	8,12,15,18		4.5 0.0	12"	- Gray brown silty clay, some sand, wet, no odors - Dark gray silty clay (no sand), moist, no odors - Dark gray silty clay (piece of brick), moist, no odors - Dark gray silty clay, moist, no odors
15	8,8,11,13		0.0	12"	▽ Initial water at 16 feet
					SILT - Dark gray silt, some sand, no odors, wet
20			20 4.5	0	- Gray silt with pebbles, wet, slight odor - Water, no recovery
25					
30					BORING COMPLETED AT 30 FEET ▼ Static water at 30 feet

Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun: Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
 Location Phillips Island Permit No. N/A
 Boring number SB-4/ MW-117 Total Depth 30 ft. Diameter 10 in.
 Casing Elevation 22.69 Water Level: Initial Static 10 ft.
 Screen Dia. 4-inch Length 25 ft Slot Size 0.020 inch
 Casing Dia. 4-inch Length 5 ft Type PVC
 Drilling Method Hollow Stem Auger Sample Method Split-Spoon
 Completion Details Protective Iron Riser with Locking Lid
 Driller Lutz Environmental Log By L. Leitzel Date 12 May 95

Sketch Map

AOI-7

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
					SILT - Medium brown silt, some cobbles, some fill, no odors, moist
5	3,3,6,16		2.2	24"	CLAY - Gray silty clay, damp, no odors - Tan-gray silty clay, moist, no odors - Gray clay, trace silt, damp, slight odors
10	2,3,4,4		33	19"	▼ Static water at 10 feet - Dark gray clay, trace silt, damp, slight odors
15	3,4,6,6		6.6	24"	- Medium gray silty clay, some tan clay, damp, slight petroleum odors
20	3,3,3,4		6.6	24"	- Medium gray silty clay, trace tan clay, damp, slight petroleum odors, trace of coal - Some light NAPL on augers when extracted from boring.
25					
30					BORING COMPLETED AT 30 FEET



Groundwater & Environmental Services, Inc.

Drilling Log

Project Sun: Marcus Hook Refinery Owner Sun Company, Inc. (R&M)
 Location Phillips Island Permit No. N/A
 Boring number MW-121 Total Depth 30 ft. Diameter 10 in.
 Casing Elevation 17.27 Water Level: Initial 17 ft Static 14 ft.
 Screen Dia. 4-inch Length 20 ft Slot Size 0.020 inch
 Casing Dia. 4-inch Length 10 ft Type PVC
 Drilling Method Hollow Stem Auger Sample Method Split-Spoon
 Completion Details Protective Iron Riser with Locking Lid
 Driller Lutz Environmental Log By RDP Date 11 Sept 95

Sketch Map

See attached site plan

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
			0		FILL - Brown silty clay with rocks & pebbles, dry
5			0		SILT - Gray sandy silt with pebbles - Gray silt with pebbles, moist
			0		CLAY - Brown silty clay, no odor, moist - Gray silty clay, no odor, moist - Dark gray silty clay (little sand), no odor, moist
10			71		- Dark gray silty clay (little sand), slight odor, moist
			105		- Dark gray silty clay (little sand), odor, moist
			94		▼ Static adjusted water level at 14.18 feet
15			31		SILT - Dark gray silt, moist, odor
			21		▽ Initial water at 17 feet - Dark gray silt, wet, NAPL
20	10,4,5,12		52	0	
	7,5,7,6		42		
			73		
	4,5,6,6		178	6"	CLAY - Dark gray silty clay, strong odor, NAPL - Gray silty clay, no NAPL, slight odor
25	5,3,3,7		31	12"	
			0	24"	- Gray clay with a little silt, no odor, wet
	2,3,3,5		0	24"	
			0		
			0		
30			0		BORING COMPLETED AT 30 FEET

Groundwater & Environmental Services, Inc.



Drilling Log



Project Sun Marcus Hook Refinery Owner Sun Company, Inc. R&M
 Location Marcus Hook, PA Permit No. NA
 Well number MW-129 Total Depth 20 feet Diameter 10.25 inch
 Casing Elevation 12.04 feet Water Level: Initial 4 feet Static 6.91 feet
 Screen Dia. 4 inch Length 17 feet Slot Size 0.020 inches
 Casing Dia. 4 inch Length 3 feet Type PVC solid riser
 Drilling Method Auger Sample Method Split-spoon/Drill Cuttings
 Completion Details Flush-mount bolted cover with locking cap
 Driller B.L. Myers Bros., Inc. Log By M.D.W. Date March 11, 1996

Sketch Map

SEE GENERALIZED SITE PLAN

Depth (feet)	Sample No.	Well Const.	OVM ppm.	Blow Count	Lithology
					ASPHALT: -Limestone ballast below road
			2.4		CLAY:
			15		-Dark gray sandy clay, moist
					-Tan-white clay, wet, no odor Initial water level at 4 feet 
5			0	6,8,5,50	-Tan clay with gray sandy silt, moist, no odor
			1		-Gray sandy clay, moist, no odor Static water level at 6.91 feet 
			15		-Gray clay, wet, no odor
			478		-Same
			641		
10			27.9	5,12,5,11	-Gray clay, wet (small amount of NAPL at end of spoon)
			154		-Same
			641		-Gray clay, wet, with odor
15			16.5	6,8,12,8	-Dark gray clay, wet, no odor
			105		
			641		-Same
20					Boring completed at 20.0 feet



Groundwater & Environmental Services, Inc.

Drilling Log



Project Sun Marcus Hook Refinery Owner Sun Company, Inc. R&M
 Location Marcus Hook, PA Permit No. NA
 Well number MW-130 Total Depth 17.80 feet Diameter 10.25 inch
 Casing Elevation 11.38 feet Water Level: Initial 8 feet Static 11.2 feet
 Screen Dia. 4 inch Length 15 feet Slot Size 0.020 inches
 Casing Dia. 4 inch Length 2.8 feet Type PVC solid riser
 Drilling Method Auger Sample Method Split-spoon/Drill Cuttings
 Completion Details Flush-mount bolted cover with locking cap
 Driller B.L. Myers Bros., Inc. Log By M.D.W. Date March 22, 1996

Sketch Map
 SEE GENERALIZED SITE PLAN

Depth (feet)	Sample No.	Well Const.	OVM ppm.	Blow Count	Lithology
					ASPHALT: Water in ballast just under asphalt
					CLAY:
					-Gray-brown clay with sand, moist
					-Gray silty clay with gravel, moist
5			15	6,7,6,7	-Hard flakes of schist
					-Brown-gray silty clay, wet
					-Purple clay with gravel, dry, no odor
					Initial water level at 8.0 feet. 
10			29	2,3,5,5	-Gray silty clay, slightly purple, wet
					-Purple-crimson sandy clay, wet, odor and some NAPL
			3.5		Static water level at 11.2 feet 
					-Gray-purple silty clay with some gravel, wet
					-Same
15				3,5,7,7	-Gray silty clay, wet, no odor
					-Gray clay, wet, no odor
					Boring completed at 17.80 feet
20					

Groundwater & Environmental Services, Inc.

Drilling Log



Project Sun Marcus Hook Refinery Owner Sun Company, Inc. R&M
 Location Marcus Hook, PA Permit No. NA
 Well number MW-131 Total Depth 20 feet Diameter 10.25 inch
 Casing Elevation 11.67 feet Water Level: Initial 15 feet Static 5.37 feet
 Screen Dia. 4 inch Length 15 feet Slot Size 0.020 inches
 Casing Dia. 4 inch Length 5 feet Type PVC solid riser
 Drilling Method Auger Sample Method Split-spoon/Drill Cuttings
 Completion Details Flush-mount bolted cover with locking cap
 Driller B.L. Myers Bros., Inc. Log By M.D.W. Date March 22 1996

Sketch Map
 SEE GENERALIZED SITE PLAN

Depth (feet)	Sample No.	Well Const.	OVM ppm.	Blow Count	Lithology
					CONCRETE:
					-Blacktop 0-6 inches underlain by ballast, no odor
			13		CLAY:
			161		-Brown silty clay with gravel, slight odor
5			40	2,3,2,5	-Same, small rock fragments, dry, slight odor
					-Light gray clay with rock fragments, moist Static water level at 5.37 feet ▼
					-Darkbrown to gray silty clay, moist, no odor
10			12	8,8,8,9	- Dark gray fabric like material, moist, no odor
			8		-Dark gray silty clay
					-Same color, more clay and slight odor, wet at 15 ft
15					Initial water level at 15 feet ▼
			2.6	3,3,5,7	- Organic material mixed with silty clay, wet, NAPL at 15 ft
			18		-Brownish-black clay, wet
20			3		-Same
					Boring completed at 20 feet

Groundwater & Environmental Services, Inc.

Drilling Log



Project Sun Marcus Hook Refinery Owner Sun Company, Inc. R&M
 Location Marcus Hook, PA Permit No. NA
 Well number MW-132 Total Depth 18.3 feet Diameter 10.25 inch
 Casing Elevation _____ Water Level: Initial _____ Static 6.27 feet
 Screen Dia. 4 inch Length 15 feet Slot Size 0.020 inches
 Casing Dia. 4 inch Length 3.3 feet Type PVC solid riser
 Drilling Method Auger Sample Method Split-spoon/Drill Cuttings
 Completion Details Flush-mount bolted cover with locking cap
 Driller B.L. Myers Bros., Inc. Log By M.D.W. Date March 25, 1996

Sketch Map
 SEE GENERALIZED SITE PLAN

Depth (feet)	Sample No.	Well Const.	OVM ppm.	Blow Count	Lithology
			0.2		CONCRETE:
					-Blacktop 0-6 inches underlain by ballast, no odor
			4.9		SOIL:
					-Black sandy soil with small pebbles, dry, no odor,
5				6,50+	CLAY:
					-Dark brown-black silty clay, dry
					-Black silty clay, dry, no odor
					Static water level at 6.27 feet
					-Moist black clay, plastic, dry, no odor
					-Gray slightly silty clay, plastic, wet Initial water level at 9 feet
10			3.1	4,5,3,7	Sand layer at 10.5 ft. clay above and below, wet, no odor
					-Black silty clay, moist
					-Sandy dark brown clay with some organics, wet, no odor
15				2,2,3,5	-Dark brown clay with some organic material, wet, no odor
					-Black sandy clay
					-Greenish brown clay, wet, slight odor
20					Boring completed at 18.3 feet

Groundwater & Environmental Services, Inc.

Drilling Log



Project Sun Marcus Hook Refinery Owner Sun Company, Inc.
 Location Marcus Hook, PA Permit No. NA
 Well number MW-133 Total Depth 18 ft. Diameter 10.25 inch
 Casing Elevation 15.26 feet Water Level: Initial 11.5 feet Static 9.06 feet
 Screen Dia. 4 inch Length 15 Slot Size 0.020 inches
 Casing Dia. 4 inch Length 3 ft. Type PVC solid riser
 Drilling Method Auger Sample Method Split-spoon/Drill Cuttings
 Completion Details Flush-mount bolted cover with locking cap
 Driller B.L. Myers Bros., Inc. Log By M.D.W. Date March 25, 1996

Sketch Map

SEE GENERALIZED SITE PLAN

Depth (feet)	Sample No.	Well Const.	OVM ppm.	Blow Count	Lithology
5				3,2,2,4	CLAY: -Dark gray plastic clay , moist, no odor -Brownish gray sandy clay, wet -Gray sandy-silty clay, wet -Poor spoon recovery of 2 inches, gray black clay moist -Gray wet clay no odor
10				2,5,10,11	-Wet, sandy gray clay with small pebbles -Poor spoon recovery of 3 inches, mostly watery gray clay with a slight sheen, little odor -Gray wet clay with some small pebbles -Same, less pebbly -Greenish-gray clay, very wet, -Reddish gray clay, wet, plastic
15					
20					
					Boring completed at 18.0 ft.



DAMES & MOORE

A DAME & MOORE GROUP COMPANY

Monitoring Well #: MW-137

Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0	Orange brown silty sand w/ rounded gravel, wet				(0-2)	Elevation (Feet)
2	Orange brown sandy silt w/ clay and gravel.					Ground Inner Outer
4						16.10 19.22 19.36
6	Clayey Silt Fill				(5-7)	Well constructed with 2 in.
8	Brown clayey silt w/ sand, fine rounded gravel, hydrocarbon-like odor, moist to wet.			0.4		schedule 40 pvc screen and casing.
10				0.9		
12				0.4	(8-10)	Well completed with 3 ft. of stickup and 3 1/4 ft. of steel casing.
14	Obstruction @ 11 ft.					
16	Silty Sand					Former Well#: MW-3
18	Orange brown silty sand w/ gravel coarse sand, wet. Natural?					
20	Coarse sand w/ silt, wet @ 15 ft.					
22						
24	Orange brown silty sand w/ rounded gravel, wet.			0.2	(18-20)	
26						
28	End of Borehole @ 20 ft.					
30						

Start Date: Feb. 9, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4

Finish Date: Feb. 10, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1



DAMES & MOORE

A TIAAW S & MOORE GROUP COMPANY

Monitoring Well #: MW-138

Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0					(0-2)	Elevation (Feet)
2	Silty Clay Fill					Ground Inner Outer
	Medium brown silty clay w/ sand and aggregates.					16.94 20.01 20.17
4				0.5		
6	Some black staining present @ 5 ft.					Well constructed with 2 in. schedule 40 pvc screen and casing.
8	Some tar-like material present @ 8 ft.				(8-10)	Well completed with 3 ft. of stickup and 3 ft. of steel casing.
10				0.7		
12				4.2	(12-14)	Former Well #: MW-4
14	Moist to wet.					
16						
18	Sandy Silt Fill					
	Orange brown sandy silt w/ rounded gravel, wet.			0.9		
20	Orange brown sandy silt /w rounded gravel, wet.					
22	Brown sand w/ silt and fine gravel, wet.			1.1		
24	Silty Sand Fill				(23-25)	
26	Gray/red sand, Orange brown silty sand w/ rounded gravel, wet.					
28	End of Borehole @ 25 ft.					
30						

Start Date: Feb. 14, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 14, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1



DAMES & MOORE

A TAYLOR & MOORE GROUP COMPANY

Monitoring Well #: MW-139

Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0	Clayey Silt Fill Brown clayey silt, wet, wood fragments, aggregates.				(0-2)	Elevation (Feet) Ground Inner Outer 20.27 22.91 23.06
2						
4						
6	Silty Clay Fill Brown silty clay w/ sand and gravel, wet, slight hydrocarbon-like odor.					Well constructed with 2 in. schedule 40 pvc screen and casing.
8						
10	Silty Clay Mottled brown/orange silty clay, moist to wet.			4.2	(8-10)	Well completed with 2 3/5 ft of stickup and 2 3/4 ft. of steel casing.
12						
14						Former Well #: MW-6
16	Red/orange mottled silty clay w/ sand and gravel.			1.8	(17-19)	
18						
20	Orange brown sand and gravel w/ silty clay, wet, slight hydrocarbon-like odor.			0.9		
22						
24	End of Borehole @ 25 ft.				(23-25)	
26						
28						
30						

Start Date: Feb. 10, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4

Finish Date: Feb. 10, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

**DAMES & MOORE**

A DAWIDSON & MOORE GROUP COMPANY

Monitoring Well #: MW-140**Boring Location:** Phillips Island**Project:** Phase II**Client:** FPLE/Sunoco**Date:** March 16, 2000**Project No:** 25995-046**Site Address:** Marcus Hook, PA**Field Personnel:** Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0	Clayey Silt Fill Medium brown clayey silt w/ sand and gravel, aggregates.			1.2 0.7	(0-2)	Elevation (Feet) Ground Inner Outer 14.82 17.80 17.90
2						
4	Silty Clay Fill Brown to dark brown silty clay w/ sand and gravel, hard/dry, hydrocarbon-like odor.					Well constructed with 2 in. schedule 40 pvc screen and casing.
6	Brown silty clay, moist to wet, hydrocarbon-like odor.				(7-9)	Well completed with 3 ft. of stickup and 3 ft. of steel casing.
8						
10	Brown silty clay w/ some wood fragments, wet, hydrocarbon-like odor present.			1.7 3.0		Former Well #: MW-2
12						
14						
16						
18					(16-18)	
20	Silty Sand Red/orange brown silty sand w/ rounded gravel, wet, hydrocarbon-like odor, native soil.					
22	Orange brown coarse sand w/ silt, moist to wet, some rounded gravel.					
24	Orange brown sandy silt w/ clay, mottled, moist.				(23-25)	
26	End of Borehole @ 25 ft.					
28						
30						

Start Date: Feb. 9, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 9, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1



DAMES & MOORE

A DAIWA S & MOORE GROUP COMPANY

Monitoring Well #: MW-141

Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0	Silty Clay Fill					Elevation (Feet)
2	Orange brown silty clay w/ sand and aggregates.					Ground Inner Outer
	Gray brown silty clay w/ sand and gravel.					10.07 12.83 13.26
4	Black staining present, hydrocarbon-like odor @ 4 ft.					
6						Well constructed with 2 in. schedule 40 pvc screen and casing.
8						
10						Well completed with 2 3/4 ft. of stickup and 3 1/5 ft. of steel casing.
12						
14						Former Well #: MW-1
16						
18	Some structure present. Native?					
	Gray silty clay w/ some fine sand and silt.					
20						
22						
24						
26	End of Borehole @ 25 ft.					
28						
30						

Start Date: Feb. 16, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 16, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1



DAMES & MOORE

A DAVIS & BROOKS GROUP COMPANY

Monitoring Well #: MW-142

Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 17, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0	Silty Clay Fill					Elevation (Feet)
2	Olive green to dark gray silty clay, hydrocarbon-like odor, moist, medium compaction, high plasticity.					Ground 22.18 Inner 24.78 Outer 25.29
4	Oily residue (staining).					Well constructed with 2 in. schedule 40 pvc screen and casing.
6						Well completed with 2 1/2 ft. of stickup and 3 ft. of steel casing.
8	Olive green to dark gray silty clay, hydrocarbon-like odor, residue, very moist, medium compaction, high plasticity.					Former Well #: MW-11
10	Yellowish orange staining, wood and brick fragments.					Lithology and PID readings from nearby GP-PH4.
12	Olive green to dark gray silty clay, hydrocarbon-like odor, residue, brick fragments, very moist, medium compaction, high plasticity.					
14						
16						
18						
20						
22	Olive green to dark gray silty clay, brick fragments, hydrocarbon-like odor, very moist, medium compaction, high plasticity.					
24						
26	Olive green to dark gray silty clay w/ some gravel, hydrocarbon-like odor, residue, moist, medium compaction, high plasticity.					
28						
30	No Recovery.					
32						
34	Silty Clay Fill					
36	Olive green to dark gray silty clay, hydrocarbon-like odor, residue, very moist to wet, medium compaction, high plasticity.					
38						
40	Olive green to dark gray silty clay, hydrocarbon-like odor, residue, very moist, loosely compacted, high plasticity.					
42						
44	Natural material @ 42 ft.					
46	Olive green to dark gray silty clay, hydrocarbon-like odor, residue, moist, medium compaction, high plasticity.					
48						
50	Orange coarse sand.					
52	End of Borehole @ 48 ft.					
54						

Start Date: Feb. 15, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 15, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

**DAMES & MOORE**

A DAIWA S.R. MOORE GROUP COMPANY

Monitoring Well #: MW-143**Boring Location:** Phillips Island**Project:** Phase II**Client:** FPLE/Sunoco**Date:** March 17, 2000**Project No:** 25995-046**Site Address:** Marcus Hook, PA**Field Personnel:** Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0						Elevation (Feet)
2				2.9		Ground Inner Outer
4	Silty Clay Fill					23.32 26.18 26.02
6	Olive green to dark gray silty clay w/ gravel, hydrocarbon-like odor, moist, medium compaction, high plasticity.			9		Well constructed with 2 in. schedule 40 pvc screen and casing.
8				2		Well completed with 2 4/5 ft. of stickup and 2 3/4 ft. of steel casing.
10	Olive green to dark gray silty clay w/ some gravel, hydrocarbon-like odor, residue, moist, medium compaction, high plasticity.			1	(13 for VOC's)	Former Well #: MW-9
12						Lithology and PID readings taken from GP-PH3, which is located nearby.
14	Free product present.					
16						
18						
20						
22	Olive green to black silty clay, hydrocarbon-like odor, moist, tightly compacted, high plasticity, free product present.					
24						
26						
28						
30						
32						
34	Olive green to black silty clay, hydrocarbon-like odor, moist, medium compaction, high plasticity, free product present.					
36						
38						
40						
42	Olive green to black silty clay, hydrocarbon-like odor, moist to wet, medium compaction, high plasticity, free product present.					
44						
46	Olive green to dark gray silty clay w/ orange sand, hydrocarbon-like odor, moist to wet, medium compaction, high plasticity, some free product present.					
48						
50						
52	Natural material @ 45.5 ft.					
54	End of Borehole @ 48 ft.					

Start Date: Feb 14, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 14, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1



DAMES & MOORE

A DAW S & MOORE GROUP COMPANY

Monitoring Well #: MW-144

Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 17, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0	Silty Clay Fill					Elevation (Feet)
2	Yellowish brown silty clay w/ sand, gravel, hydrocarbon-like odor, moist.					Ground Inner Outer
4						22.36 24.91 25.06
6	Gray to dark gray silty clay w/ sand, gravel, hydrocarbon-like odor, some residue, moist, tightly compacted, high plasticity.					Well constructed with 2 in. schedule 40 pvc screen and casing.
8						Well completed with 2 1/2 ft. of stickup and 2 3/4 ft. of steel casing.
10	Silty Sand Fill					Former Well #: MW-8
12	Yellowish brown to gray silty sand w/ gravel, hydrocarbon-like odor, moist, loosely compacted, medium plasticity, white waxy material present.					Lithology, and PID readings taken from GP-PH2, which is located nearby.
14						
16	Silty Clay Fill					
18	Dark gray to black silty clay w/ gravel and cobble, hydrocarbon-like odor, some residue, moist, medium compaction, medium plasticity, concrete fragments present.					
20						
22	Olive green to dark gray silty clay w/ some sand and gravel, hydrocarbon-like odor, some residue, moist, medium compaction, high plasticity.					
24						
26	Dark gray to black silty clay w/ sand and gravel, hydrocarbon-like odor, some residue, moist, medium compaction, high plasticity					
28						
30	Olive green to dark gray silty clay w/ some gravel, hydrocarbon-like odor, some residue, moist, loosely compacted, high plasticity.					
32						
34	Dark gray to black silty clay w/ gravel, hydrocarbon-like odor, residue, fairly moist, medium compaction, high plasticity					
36						
38	No lithological description from 32 ft. down.					
40						
42						
44						
46						
48						
50	End of Borehole @ 50 ft.					
52						
54						

Start Date: Feb. 15, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 15, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

**DAMES & MOORE**

A DAWES & MOORE GROUP COMPANY

Monitoring Well #: MW-145**Boring Location:** Phillips Island**Project:** Phase II**Client:** FPLE/Sunoco**Date:** March 16, 2000**Project No:** 25995-046**Site Address:** Marcus Hook, PA**Field Personnel:** Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0	Aggregates and brick fragments.				(0-2)	Elevation (Feet) Ground 28.60 Inner 31.51 Outer 31.66
2	Clayey Silt Fill (1-5 ft.)					
4	Red brown clayey silt w/ sand and gravel, brick fragments.			11.4		Well constructed with 2 in. schedule 40 pvc screen and casing.
6				5.7		Well completed with 3 ft. of stickup and 3 ft. of steel casing.
8	Silty Clay Fill (5-9 ft.)					Former Well #: MW-5
10	Brown/tan silty clay w/ sand and gravel, hydrocarbon-like odor.					
12	Sandy Silt Fill (9-11 ft.)				(11-13)	
14	Brown sandy silt w/ gravel.					
16	Concrete			11.4		
18	Clayey Silt Fill (11-23 ft.)					
20	Orange brown clayey silt, moist, hydrocarbon-like odor, some black staining.			27.8	(18-20)	
22	Silty clay, moist, hydrocarbon-like odor, black stained.					
24	Brown Silty Clay w/ gravel, wet, non aqueous liquid present.			16.6	(23-25)	
26				18.7		
28	Medium brown silty clay, moist, hydrocarbon-like odor, black stained.					
30	Silty Sand Fill (23-24.5 ft)					
32	Brown silty sand w/ clay and white granular material, wet, hydrocarbon-like odor.					
34	Silty Clay Fill (24.5-43.5 ft.)					
36	Brown silty clay w/ black staining.					
38	Brown silty clay, moist, slight hydrocarbon-like odor.					
40	Brown silty clay, moist, slight hydrocarbon-like odor.					
42						
44	Clayey Silt					
46	Red/green brown mottled clayey silt.					
48	Silty Sand			3.5	(48-50)	
50	Orange brown silty sand w/ gravel.					
52	Clayey Silt					
54	Gray clayey silt w/ some sand. End of Borehole @ 50 ft.					

Start Date: Feb. 11, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4

Finish Date: Feb. 11, 2000

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

**Handex**

Handex of Maryland

WELL LOG: MW-188

Permit #: (none)

Drill Date: July 25, 2002

Use: Monitoring Well

Location: Marcus Hook Refinery, Marcus Hook, PA.

Owner Loc #: Middle Creek

Owner: Sunoco Inc. (R&M)

Handex Loc #: 110535

Owner Address: Delaware Ave. & Green St.

Drilling Method: Hollow-stem Auger

BORING - Depth: 20 ft.

Diameter: 11.5 in.

Sampling Method: (none)

CASING - Length: 8.5 ft.

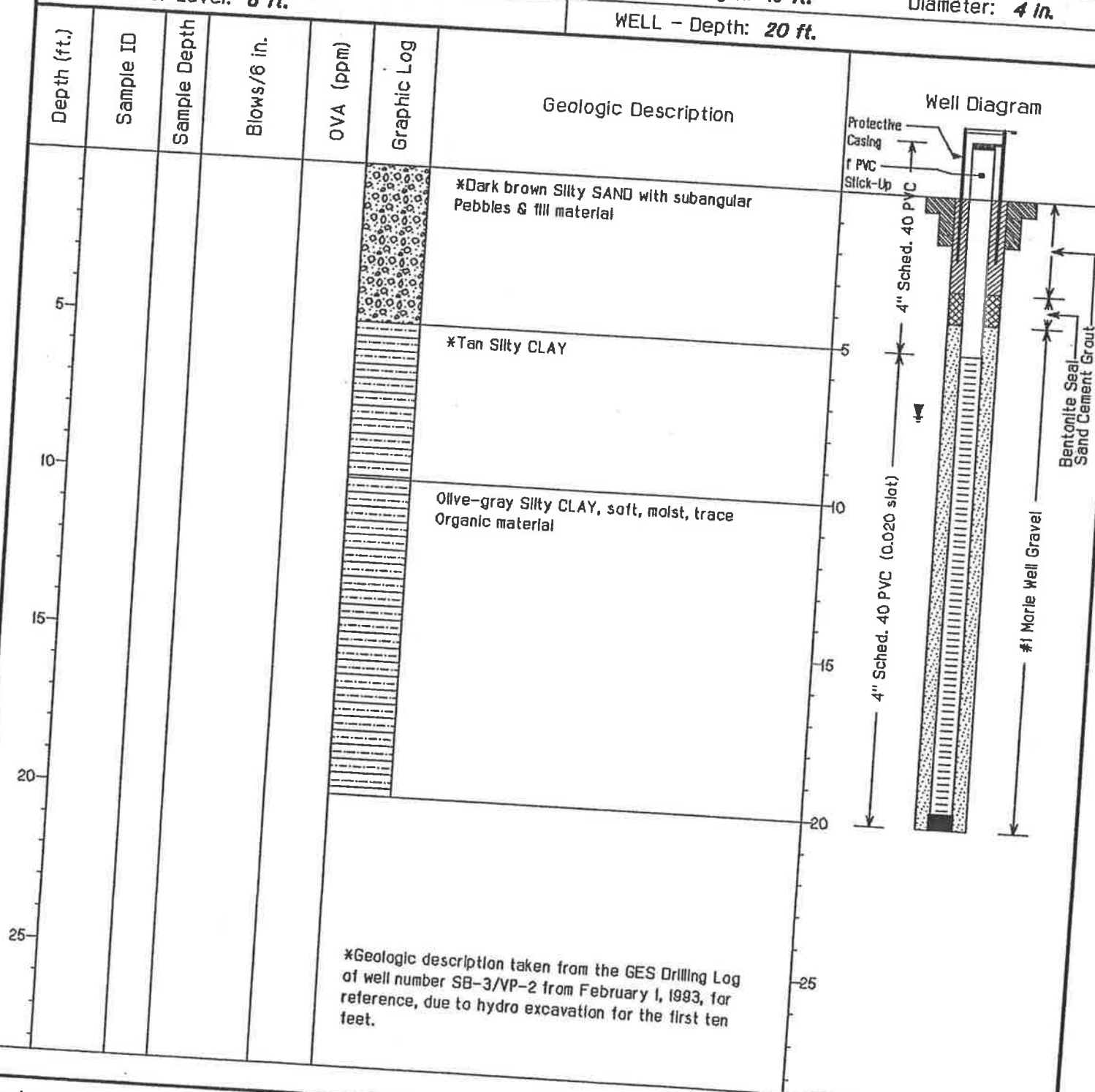
Diameter: 4 in.

Static Water Level: 8 ft.

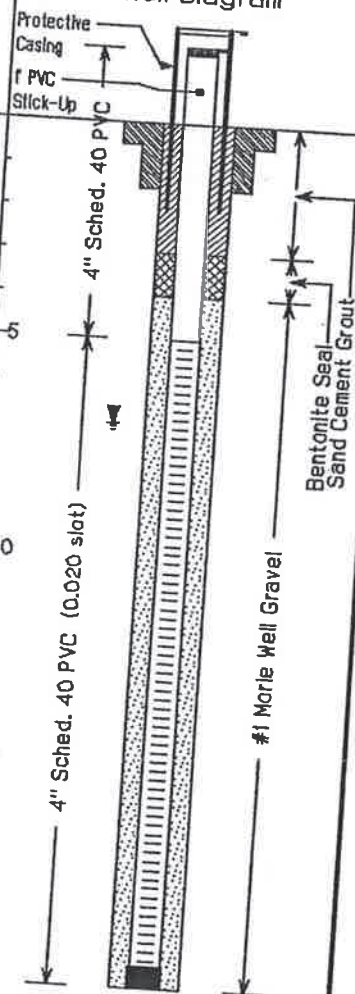
SCREEN - Length: 15 ft.

Diameter: 4 in.

WELL - Depth: 20 ft.



Well Diagram



Geologist: Wayne Zimmerli

Driller: Handex of New Jersey

**Handex**

Handex of Maryland

WELL LOG: MW-189

Permit #: (none)

Drill Date: July 24, 2002

Use: Monitoring Well

Location: Marcus Hook Refinery, Marcus Hook, PA.

Owner Loc #: Middle Creek

Owner: Sunoco Inc. (R&M)

Handex Loc #: 110535

Owner Address: Delaware Ave. @ Green St.

Drilling Method: Hollow-stem Auger

BORING - Depth: 25 ft.

Diameter: 11.5 in.

Sampling Method: Direct Push

CASING - Length: 5 ft.

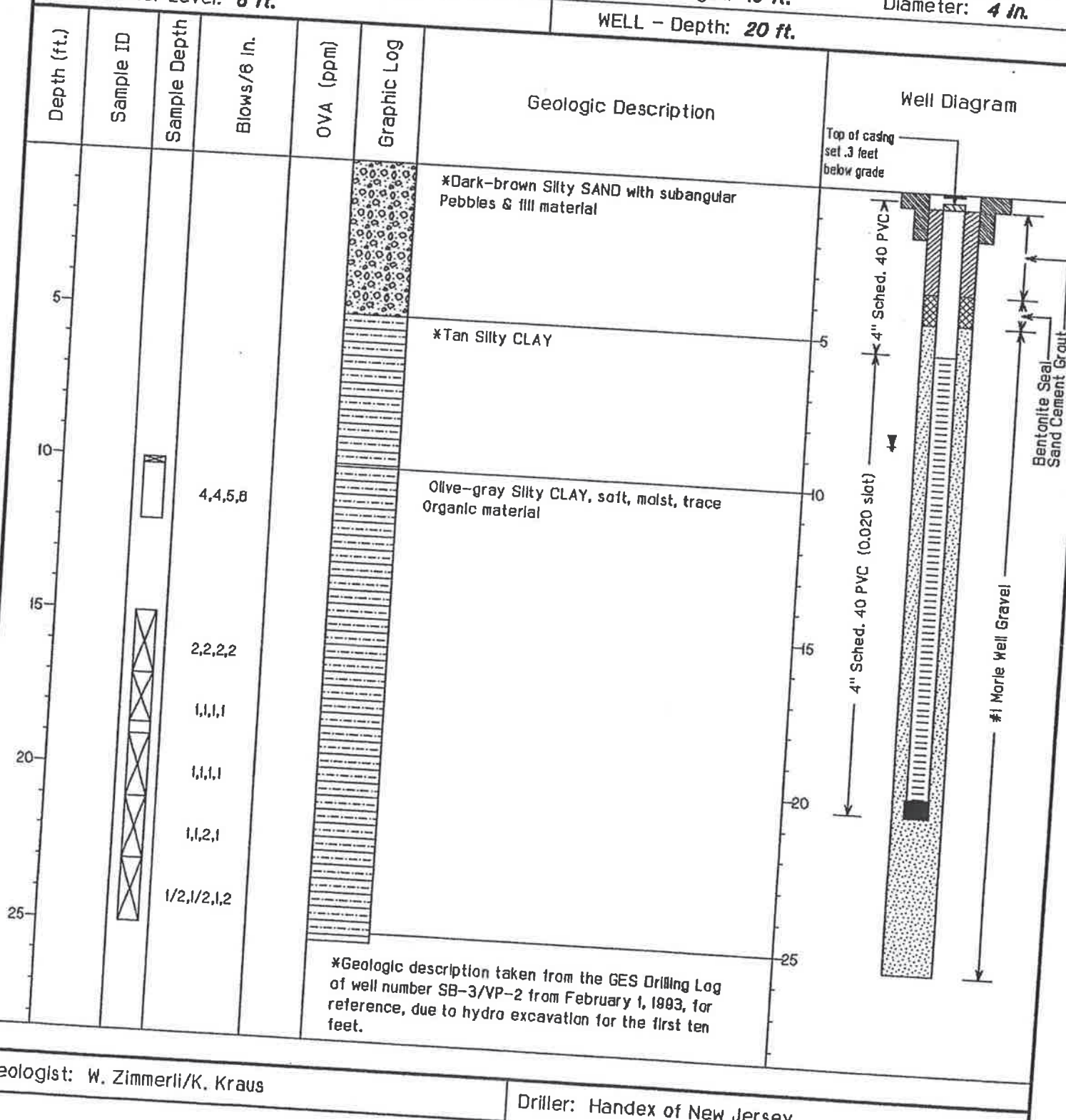
Diameter: 4 in.

Static Water Level: 8 ft.

SCREEN - Length: 15 ft.

Diameter: 4 in.

WELL - Depth: 20 ft.



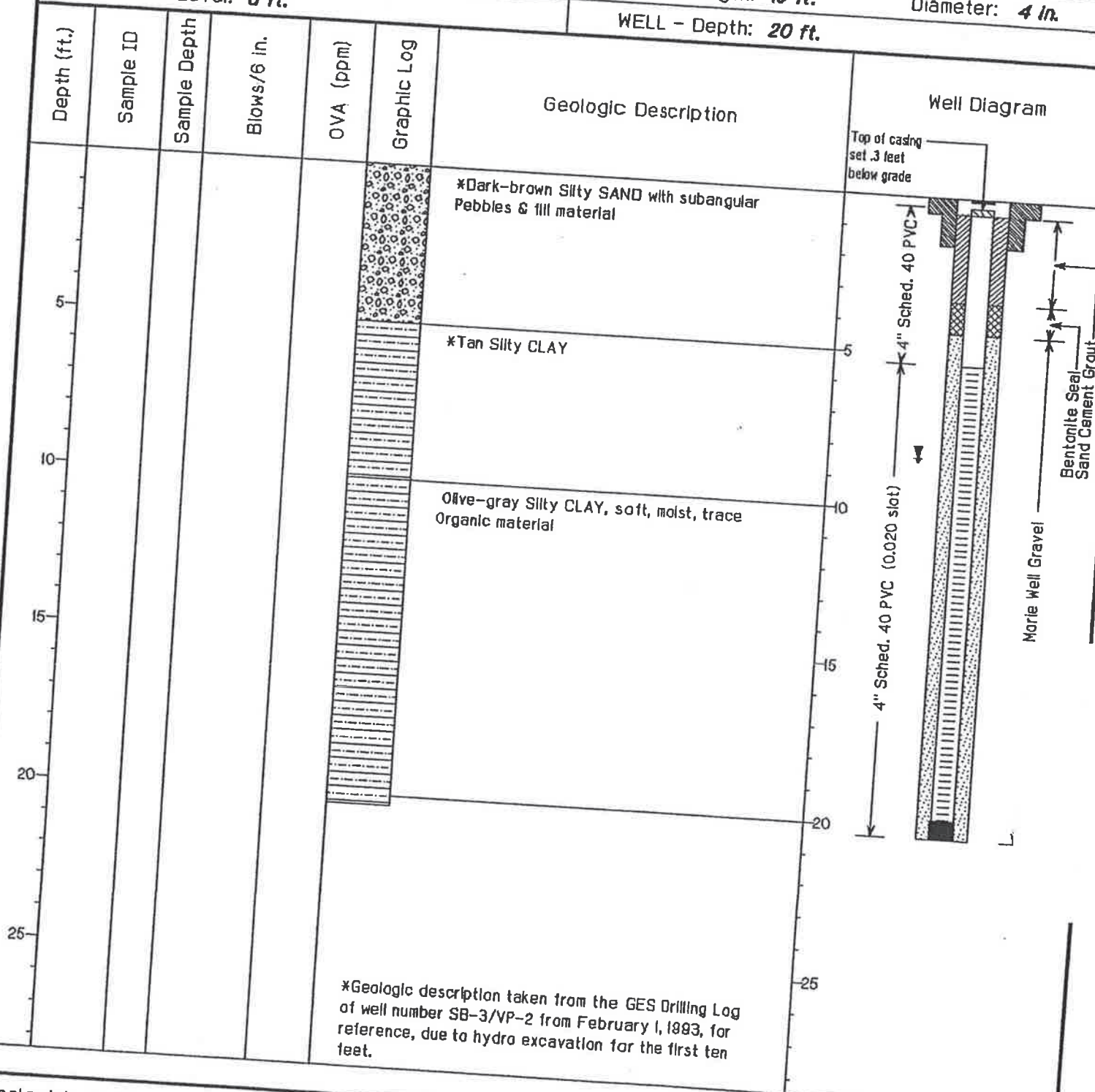
Geologist: W. Zimmerli/K. Kraus

Driller: Handex of New Jersey

**Handex**

Handex of Maryland

WELL LOG: MW-190

Permit #: *(none)*Drill Date: *July 25, 2002*Use: *Monitoring Well*Location: *Marcus Hook Refinery, Marcus Hook, PA.*Owner Loc #: *Middle Creek*Owner: *Sunoco Inc. (R&M)*Handex Loc #: *110535*Owner Address: *Delaware Ave. & Green St.*Drilling Method: *Hollow-stem Auger*BORING - Depth: *20 ft.*Diameter: *11.5 in.*Sampling Method: *Direct Push*CASING - Length: *5 ft.*Diameter: *4 in.*Static Water Level: *8 ft.*SCREEN - Length: *15 ft.*Diameter: *4 in.*WELL - Depth: *20 ft.*Geologist: *W. Zimmerli*Driller: *Handex of New Jersey*

**Handex**

Handex of Maryland

WELL LOG: MW-192

Permit #: (none)

Drill Date: July 25, 2002

Use: Monitoring Well

Location: Marcus Hook Refinery, Marcus Hook, PA.

Owner Loc #: Middle Creek

Owner: Sunoco Inc. (R&M)

Handex Loc #: 110535

Owner Address: Delaware Ave. @ Green St.

Drilling Method: Hollow-stem Auger

BORING - Depth: 20 ft.

Diameter: 11.5 in.

Sampling Method: (none)

CASING - Length: 8.5 ft.

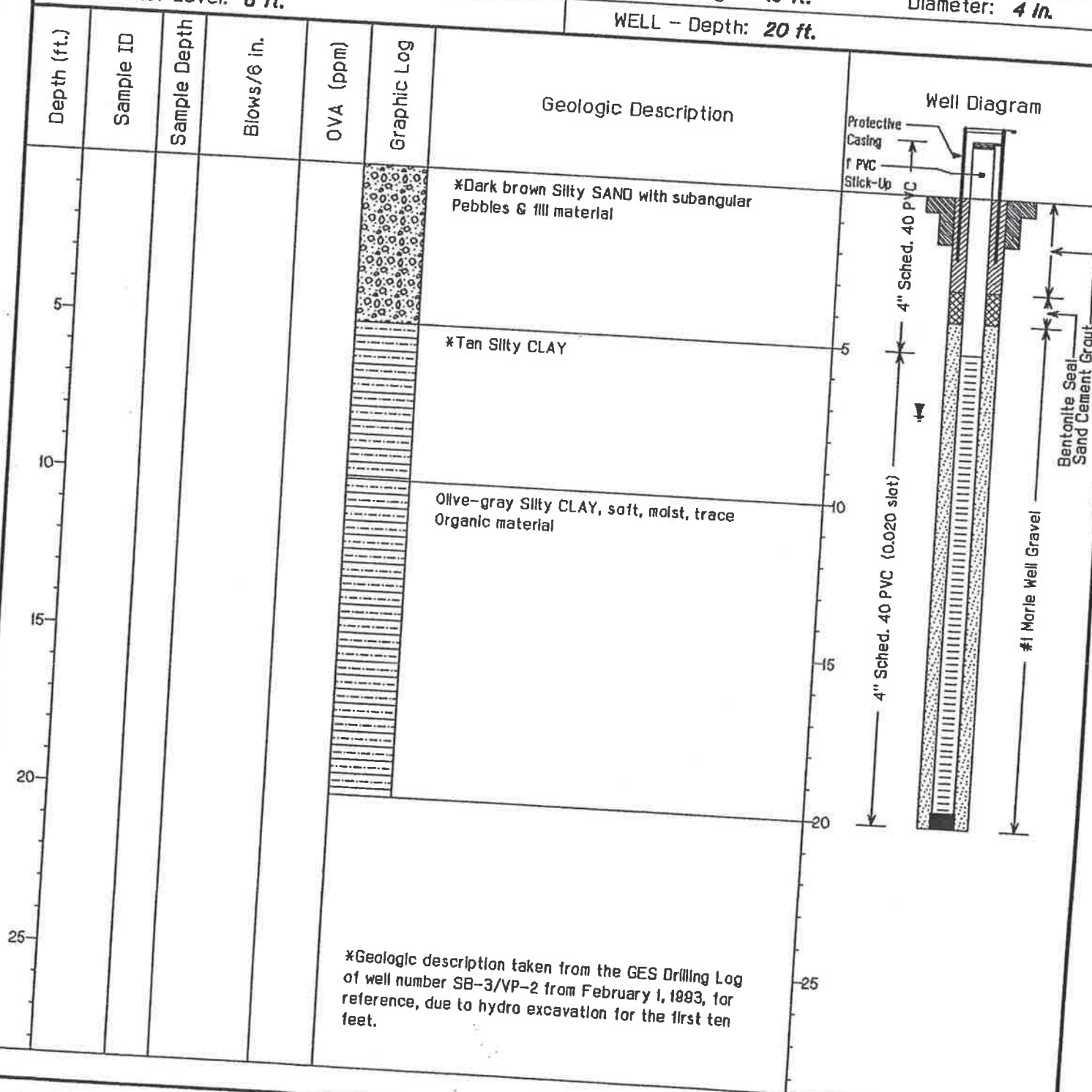
Diameter: 4 in.

Static Water Level: 8 ft.

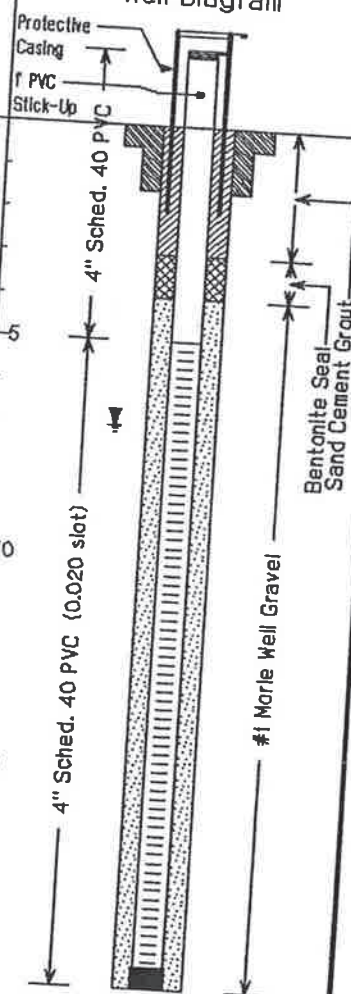
SCREEN - Length: 15 ft.

Diameter: 4 in.

WELL - Depth: 20 ft.



Well Diagram

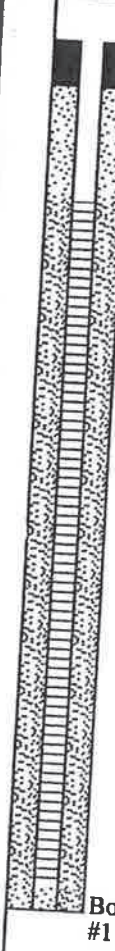


Geologist: Wayne Zimmerli

Driller: Handex of New Jersey

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/18/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc.		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-210	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 20.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PID Reading (ppm)
			SAND, fine to coarse; little silt, little fine gravel, brown, moist.					
			CONCRETE pieces				0.5	0.0
			SAND, fine; little medium to coarse sand, gray, wet.				0.6	0.0
	5		SAND, fine; little medium to coarse sand, gray, wet.				1.8	0.0
			CLAY; some silt, trace fine to coarse sand, gray, dry.				0.9	0.0
			CLAY AND SILT; trace fine to coarse sand, gray/dark gray, dry.				0.0	0.0
	10		SILT; little clay, little fine to coarse sand, trace fine gravel, gray, dry.				0.4	0.0
			SILT; little clay, little fine to coarse sand, trace fine gravel, gray, dry.				1.2	0.0
			CLAY; trace silt, tan/white, dry.					
			SAND, fine; oily, sticky, moist.					0.0
			SILT; some clay, little fine to coarse sand, dark gray, moist.				0.8	0.0
			SAND, fine AND SILT; little medium to coarse sand, dark gray, dry/moist.					0.0
	15		CLAY; some silt, little fine to coarse sand, dark gray, moist.					0.0
			CLAY; some fine to coarse sand, little silt, dark gray, moist.				1.3	0.0
			CLAY; little fine to coarse sand, little silt, dark gray/black, dry.					0.0
			CLAY; some silt, some fine to coarse sand, dark gray, moist.				1.1	0.0
	20		CLAY; trace silt, trace fine sand, dark gray/black, dry.					0.0
			CLAY; trace silt, trace fine sand, dark gray/black, moist.					0.0
		CLAY; little fine sand, trace silt, dark gray, moist.				1.0	0.0	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

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PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Log of Well

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/17/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-211	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 20.0	Drive wt. (lbs.):	Drop Dist. (in.):
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PD Reading (ppm)
			SAND, fine; little medium to coarse sand, gray, moist.				1.0	0.0
			SAND, fine; little medium to coarse sand, trace fine rounded gravel, gray, moist.				0.8	0.0
	5		SAND, fine; little medium to coarse sand, trace fine rounded gravel, gray, moist.				1.3	0.0
			SILT; little fine sand, black, dry. CLAY AND SILT; little fine to coarse sand, black, dry.				1.0	0.0 7.6
	10		CLAY AND SILT; little fine to medium sand, black, dry. In middle of recovery, a 0.2 foot section of tan, fibrous, asbestos-like material was observed. Tough drilling from 8.5 to 9.5 feet.				0.9	0.0
			CLAY AND SILT; little fine to medium sand, black, dry.				1.0	0.0
			SAND, fine; little medium to coarse sand, little clay, gray, moist.				0.4	0.0 0.0
			CONCRETE pieces; oil on split spoon. CLAY AND SILT; some fine to medium sand, gray, moist, oil.				1.0	0.0 0.0
	15		CLAY; some silt, little fine to medium sand, gray, moist.				1.0	0.0
			CLAY; little silt, little fine to medium sand, gray, moist. CLAY; little silt, little fine to coarse sand, dark gray, moist.				1.0	18.2 14.2
	20		CLAY; little silt, little fine to medium sand, gray/dark gray/black, moist.				1.4	6.2

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Date **2002**

PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Log of Well

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/18/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-212	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 20.0	Drive wt. (lbs.):	Drop Dist. (in.):
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PID Reading (ppm)
			SAND, fine; some medium to coarse sand, little fine to coarse gravel, brown, moist.				1.1	0.0
			SAND, fine; little medium to coarse sand, gray, moist.					0.0
			SAND, fine; little medium to coarse sand, gray, moist/wet.				1.6	0.0
	5		SAND, fine; little medium to coarse sand, gray, moist/wet.				1.7	0.0
			SILT; little fine sand, black, dry.					0.0
			SILT; little clay, trace fine sand, gray/dark gray, dry.				1.6	0.0
			SAND, fine; little medium to coarse sand, black, wet.				2.0	0.0
	10		CLAY AND SILT; trace fine sand, gray/black, dry.					0.0
			SAND, fine; little medium to coarse sand, gray, moist.				1.2	0.0
			CLAY; some silt, trace fine sand, black, moist.					35.3
			CLAY; some silt, trace fine sand, black, moist.				1.6	81.6
			CLAY; little silt, trace fine sand, black, moist.					35.9
	15		CLAY; little silt, trace fine sand, black, moist.				2.0	175
			CLAY; little silt, trace fine sand, black, moist.				1.7	58.1
20		CLAY; little silt, trace fine sand, black, moist.				2.0	66.5	

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PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

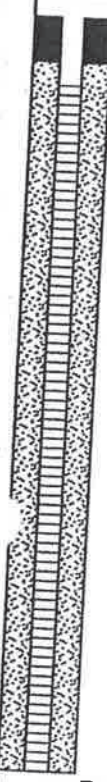
Log of Well

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/20/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc.		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-213	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 17.0	Drive wt. (lbs.):	Drop Dist. (in.):	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PID Reading (ppm)
			CLAY; some fine to coarse sand, brown, moist.				1.0	0.0
			SILT AND SAND, fine to coarse; little fine gravel, gray, dry.					0.0
			SILT; little fine sand, black, dry.				0.4	0.0
	5		SILT; little fine sand, black, dry.					
			CLAY; little fine to coarse sand, little silt, brown/black, dry.				1.1	0.0
			CLAY; little fine to coarse sand, little silt, brown/black, dry.				1.2	0.0
			CLAY; little fine sand, little silt, brown/black, moist.					0.0
			CLAY; trace fine sand, black, moist.				0.9	14.7
	10		CLAY; little silt, trace fine sand, black, moist.					
			CLAY AND SILT; little fine to coarse sand, black/brown, moist.				1.0	11.3
			CLAY; some silt, little fine to coarse sand, black, moist.					
	15		SILT; little fine sand, little clay, black/gray, dry.				1.3	14.1
		SILT; some clay, little fine sand, black, dry.				1.1	19.3	
20								

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Log of Well


Figure

(sheet 1 of 1)

HILIPS ISLAND.GPJ
LOG OF BOREHOLE

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/19/02	Drilling Contractor: Parratt-Wolff, Inc.	Project Name: Sunoco, Inc.		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-214	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 17.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PTD Reading (ppm)
			SILT; some fine to coarse sand, some fine gravel, brown, moist.				0.9	0.0
			SAND, fine to coarse; somewhat consolidated, white, dry.					
			SAND, fine to coarse; somewhat consolidated, white, dry.					
			Tough drilling.					
			CLAY; trace fine silt, pieces of brick and organic matter, black, dry.				0.5	0.0
			Tough drilling.					0.0
	5		SAND, fine to coarse, (fire brick?), orange, dry.				0.1	0.0
			Tough drilling.					
			SAND, fine to medium; little coarse sand, little clay, black, wet.				0.3	0.0
			Unable to drill past 7 feet. Moved well approximately 6 feet to the south and away from fence.					
	10		CLAY; little fine to coarse sand, pieces of brick, black, dry.				0.6	0.0
			CLAY; little silt, little fine to coarse sand, black, moist.					
		SAND, coarse; little fine to medium sand, black, wet.				1.0	0.0	
		CLAY; some silt, trace fine to coarse sand, black/gray, dry.					21.2	
		CLAY; some silt, little fine to coarse sand, black, moist.				1.0	11.4	
						1.0	13.9	
15		SAND, fine; orange-brown, sticky.						
		SILT AND CLAY; trace fine to medium sand, black, dry.				0.7	0.0	
		Piece of metal (1 inch long by 0.25 inch wide) within recovery.						
		SILT AND CLAY; little fine to medium sand, black, dry.				1.0	5.3	
20		SILT AND CLAY; little fine to medium sand, black, dry.				0.6	0.0	

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PHILIPS ISLAND.GPJ
LOG OF BOREHOLE


Log of Well

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/19/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc.		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-215	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 17.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PTD Reading (ppm)
			SILT; little clay, some fine to coarse sand, brown, moist.					
			CLAY; some silt, trace fine sand, black, dry.				0.3	0.0
			NO RECOVERY - piece of brick in shoe of spoon covered with black clay, some silt, trace fine sand, moist.				0.0	0.0
	5		CLAY; some silt, trace fine to medium sand, black, moist.				0.4	39.3
			CLAY; little silt, little fine to coarse sand, black, moist.				0.6	38.9
			CLAY; little silt, little fine to coarse sand, black, moist.					
	10		SILT; some clay, little fine sand, black/gray, dry.				1.1	75.3
			SILT; little coarse sand, trace fine to medium sand, black, dry.				0.7	17.4
			CLAY; some silt, little coarse sand, trace fine to medium sand, black, moist.				0.5	72.3
	15		CLAY AND SILT; trace fine sand, black/gray, moist.				0.4	6.3
		CLAY; some silt, little fine to medium sand, black, moist.				0.5	125	
20								

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Project No. **62SU.01009.02**

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HILIPS ISLAND.GPJ
LOG OF BOREHOLE


Log of Well

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 06/25/02 06/26/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-216	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description			Recovery	PID Reading (ppm)	
			SAND, fine to coarse AND SILT; little fine gravel, pieces of brick, brown, dry.			1.3	0.0	
			SILT AND SAND, fine to coarse; little fine gravel, pieces of brick, brown, dry.				0.0	
			SILT AND SAND, fine to coarse; little fine gravel, pieces of brick, brown, dry.			1.2	0.0	
			BRICK				0.0	
			SILT; some fine to coarse sand, some fine gravel, brown, dry.				0.0	
	5		SILT; little fine to coarse sand, brown, dry.			0.4	0.0	
			SILT; little fine to coarse sand, brown, dry.			1.2		
			SAND, coarse AND GRAVEL, fine; trace fine to coarse sand, black, moist, oil.					
			SILT AND SAND, fine to coarse; trace fine gravel, black, moist, oil.			1.8		
	10		CLAY; some fine to coarse sand, little silt, brown/gray, dry.					
			CLAY; some silt, little fine to medium sand, gray, moist, oil.			1.0		
			CLAY AND SILT; little fine to coarse sand, trace fine gravel, gray, moist, oil.			1.1		
			CLAY; some silt, little fine to medium sand, gray, moist.					
	15		SILT; some clay, little fine to medium sand, black, dry.			1.3		
			CLAY; some silt, little fine to medium sand, brown/gray, moist.			1.8		
		SILT; some clay, trace fine to medium sand, black, dry.						
		SILT; some clay, little fine to medium sand, trace coarse sand, black, moist.			1.1			
20		CLAY; some silt, little fine to medium sand, trace coarse sand, black, moist.			1.3			
		CLAY; some silt, little fine to medium sand, trace coarse sand, black, moist.			1.0			
		SILT; some clay, little fine to medium sand, black, moist.						
		SILT AND CLAY; trace fine to coarse sand, black, moist.			0.9			

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Project No. **62SU.01009.02**

Date **2002**

Log of Well

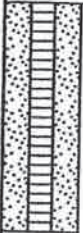

PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 2)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 06/25/02 06/26/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-216	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PID Reading (ppm)
	30		SILT AND CLAY; trace fine to coarse sand, black, moist.				1.0	
			CLAY; trace fine sand, black, moist.				1.4	
	35							
	40							
	45							

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **62SU.01009.02**

Date **2002**

Log of Well

PHILIPS ISLAND.GPJ
LOG OF BOREHOLE


Figure

(sheet 2 of 2)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/27/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Cuttings		Well Number: MW-217	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):

Well Construction	Depth, (ft.)	Sample Type	Description
			SAND, fine to coarse; some silt, little fine gravel, pieces of brick, brown, dry.
			SILT; some clay, little fine gravel, little fine to coarse sand, dark brown, dry.
	5		CLAY; little silt, little fine to coarse sand, black, moist.
			GRAVEL, fine AND SAND, coarse; trace silt, trace fine to medium sand, black, moist.
	10		CLAY; little silt, little fine to medium sand, gray/brown, moist.
	15		CLAY; trace fine to coarse sand, trace silt, gray, moist, oil.
	20		SILT; little fine to coarse sand, little clay, gray, moist.
			CLAY; little fine to coarse sand, little silt, black, moist, oil from 17 feet to approximately 22 feet.

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **62SU.01009.02**

Date **2002**

Log of Well




PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 2)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/27/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Cuttings		Well Number: MW-217	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt. (lbs.):	Drop Dist. (in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					
								
			CLAY; trace fine sand, black, moist.					
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. **62SU.01009.02**

Date **2002**

Log of Well

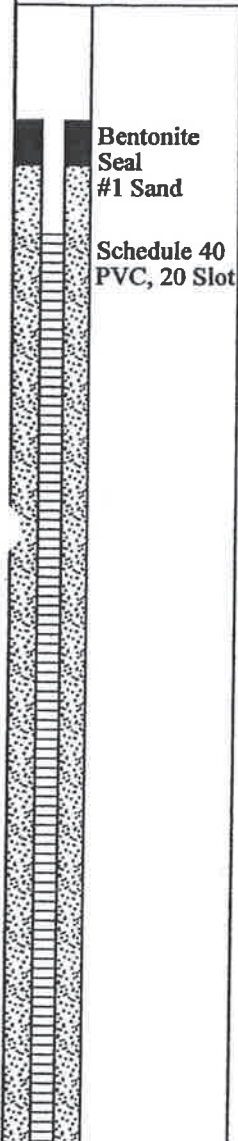
PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/26/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Cuttings		Well Number: MW-218
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist (in.):
Well Construction	Depth, (ft.)	Sample Type	Description				
			SAND, fine to coarse AND SILT; little fine gravel, pieces of brick, brown, dry.				
			CLAY AND SILT; little fine to coarse sand, brown, dry.				
	5		SILT; little clay, little fine to coarse sand, black, dry.				
			SILT; little clay, little fine to coarse sand, trace fine gravel, black, dry.				
	10		CLAY; some silt, little fine to coarse sand, gray, moist, oil at approximately 12 feet.				
	15		SILT AND CLAY; little fine to coarse sand, black, moist.				
	20		SILT; some clay, little fine to coarse sand, black, moist, plastic present at approximately 21 feet.				
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>							

Project No. **62SU.01009.02**

Date **2002**

Log of Well



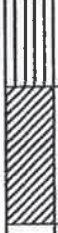
PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 2)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/26/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Cuttings		Well Number: MW-218
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type	Description				
			CLAY; little silt, trace fine sand, black, moist.				
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>							

Project No. **62SU.01009.02**

Date **2002**

Log of Well

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LOG OF BOREHOLE

Figure

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SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/26/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA	Method/Equipment: Hollow Stem Auger Split Spoon	Well Number: MW-219
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0
				Drive wt.(lbs.):	Drop Dist.(in.):

Well Construction	Depth, (ft.)	Sample Type	Description	Recovery	PTD Reading (ppm)
			SILT; some fine to coarse sand, trace fine gravel, brown, dry.	1.0	7.1
			SILT; some fine to coarse sand, trace fine gravel, piece of brick, brown, dry.	0.8	5.3
			SILT; some fine to coarse sand, little clay, gray, moist.		25.6
			SILT; little fine to coarse sand, little clay, pieces of brick, black, dry.	0.6	22.9
	5		SILT; little fine to coarse sand, little clay, black, dry.	1.4	5.5
			SILT; some clay, little fine to coarse sand, gray, dry.		13.8
			SAND, fine to coarse AND SILT; gray, dry.		22.1
			NO RECOVERY - stone in shoe of spoon.	0.0	
	10		CLAY; some silt, little fine to medium sand, piece of wood, gray/brown, moist.	0.3	25.8
			CLAY AND SILT; little fine to coarse sand, brown, moist, oil.	1.3	14.4
			SILT; some fine to medium sand, little clay, gray/black, moist.		20.0
			SILT; little fine to coarse sand, little clay, gray, moist.	0.2	5.3
	15		SILT; some clay, little fine to medium sand, piece of wood, gray/brown, moist.	1.1	13.0
			SILT; some clay, little fine to medium sand, gray/brown, moist.	1.1	0.0
			SILT; some fine to medium sand, black, dry.		7.4
	20		CLAY; little silt, little fine to coarse sand, pieces of brick and wood, brown, moist.	1.4	3.1
			SILT; little clay, little fine to medium sand, black, moist.		6.1
			CLAY; trace silt, trace fine sand, black, moist.		25.0
			CLAY; little fine sand, trace silt, black, moist.	0.6	16.5
			CLAY; little fine sand, trace silt, black, moist.	1.3	17.6

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 2002

Log of Well


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LOG OF BOREHOLE

Figure

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SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/26/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-219		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):		
Well Construction	Depth, (ft.)	Sample Type	Description					Recovery	PID Reading (ppm)
									
			CLAY; little fine sand, trace silt, black, moist.					2.0	34.1
			CLAY; little fine sand, trace silt, black, moist.					2.0	23.0
	30								
	35								
	40								
	45								

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **62SU.01009.02**

Date **2002**

Log of Well

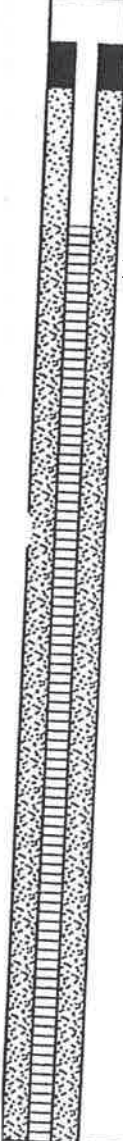
PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

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SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/27/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-220	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 30.0	Drive wt. (lbs.):	Drop Dist. (in.):
Well Construction	Depth. (ft.)	Sample Type	Description				Recovery	PID Reading (ppm)
			SILT; little fine to coarse sand, trace clay, trace fine gravel, brown, dry.				1.1	0.0
			CLAY; some silt, little fine to coarse sand, brown, dry.				1.2	0.0
			CLAY; some silt, little fine to coarse sand, little silt, brown, dry.					5.0
			SAND, fine to coarse; little silt, gray, dry.				0.6	0.0
			SAND, fine to coarse; little silt, little fine gravel, gray, dry.					0.0
			CLAY; little silt, little fine to coarse sand, brown/gray, moist.				0.7	0.0
			CLAY; little fine to medium sand, little silt, trace coarse sand, brown/gray, moist.				0.5	6.0
			CLAY; some silt, little fine sand, gray, moist. Piece of fine gravel in shoe of spoon.				0.3	5.3
			CLAY; some silt, little fine sand, gray, moist.				0.5	0.0
			CLAY; little fine sand, some silt, black, moist.				0.5	8.0
			CLAY AND SILT; trace fine to coarse sand, black, moist.				0.6	21.0
			CLAY AND SILT; trace fine to coarse sand, black, moist.				1.0	9.7
			SAND, fine to medium; orange brown, moist.				0.9	7.6
			CLAY AND SILT; trace fine to coarse sand, black, moist.					5.0
		SILT; little clay, little fine to medium sand, black, moist.				9.6		
		SILT; some clay, trace fine to coarse sand, black, moist.				0.8	22.5	
		SILT; little fine to coarse sand, black, moist, oil.				0.1	25.1	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **62SU.01009.02**

Date **2002**

Log of Well



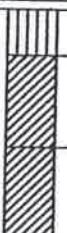
Figure

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LOG OF BOREHOLE

(sheet 1 of 2)

SECOR

International Incorporated

Logged By: SM	Date Drilled: 06/27/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-220	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt. (lbs.):	Drop Dist. (in.):	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PID Reading (ppm)
			Piece of rock in shoe of spoon.				0.5	8.4
			CLAY; some silt, trace fine to coarse sand, gray, moist.					
			CLAY; some silt, little fine to coarse sand, black, moist.					
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. **62SU.01009.02**

Date **2002**

Log of Well

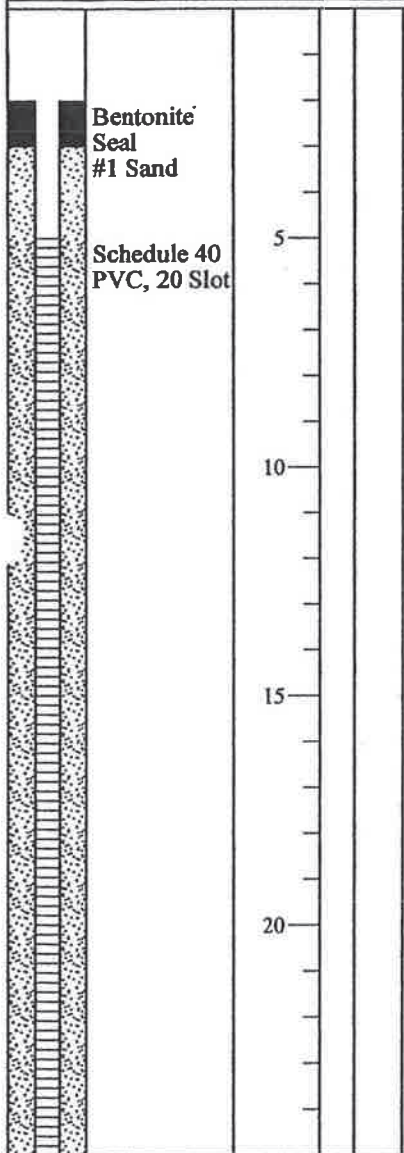
HILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 07/23/02	Drilling Contractor: Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA	Method/Equipment: Hollow Stem Auger Cuttings	Well Number: MW-221
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0
Drive wt.(lbs.):		Drop Dist.(in.):			
Well Construction	Depth, (ft.)	Sample Type	Description		
 <p>Bentonite Seal #1 Sand Schedule 40 PVC, 20 Slot</p> <p>LITHOLOGY SIMILAR TO ADJACENT WELL, MW-219</p>					
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>					

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Date **2002**

Log of Well


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LOG OF BOREHOLE

Figure

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SECOR

International Incorporated

Logged By: CY	Date Drilled: 07/23/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Cuttings		Well Number: MW-221	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					
 Bottom Plug	30 35 40 45							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. **62SU.01009.02**

Date **2002**

Log of Well

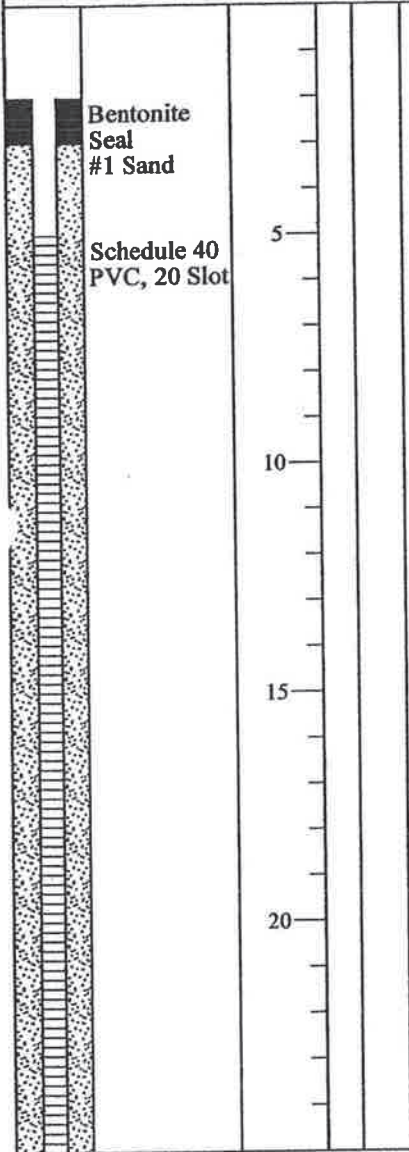
PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 07/23/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Cuttings		Well Number: MW-222
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type	Description				
			LITHOLOGY SIMILAR TO ADJACENT WELL, MW-220				
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>							

Project No. **62SU.01009.02**

Date **2002**

Log of Well

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LOG OF BOREHOLE

Figure























(sheet 1 of 2)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 07/23/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Cuttings		Well Number: MW-222	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):

Well Construction	Depth, (ft.)	Sample Type	Description
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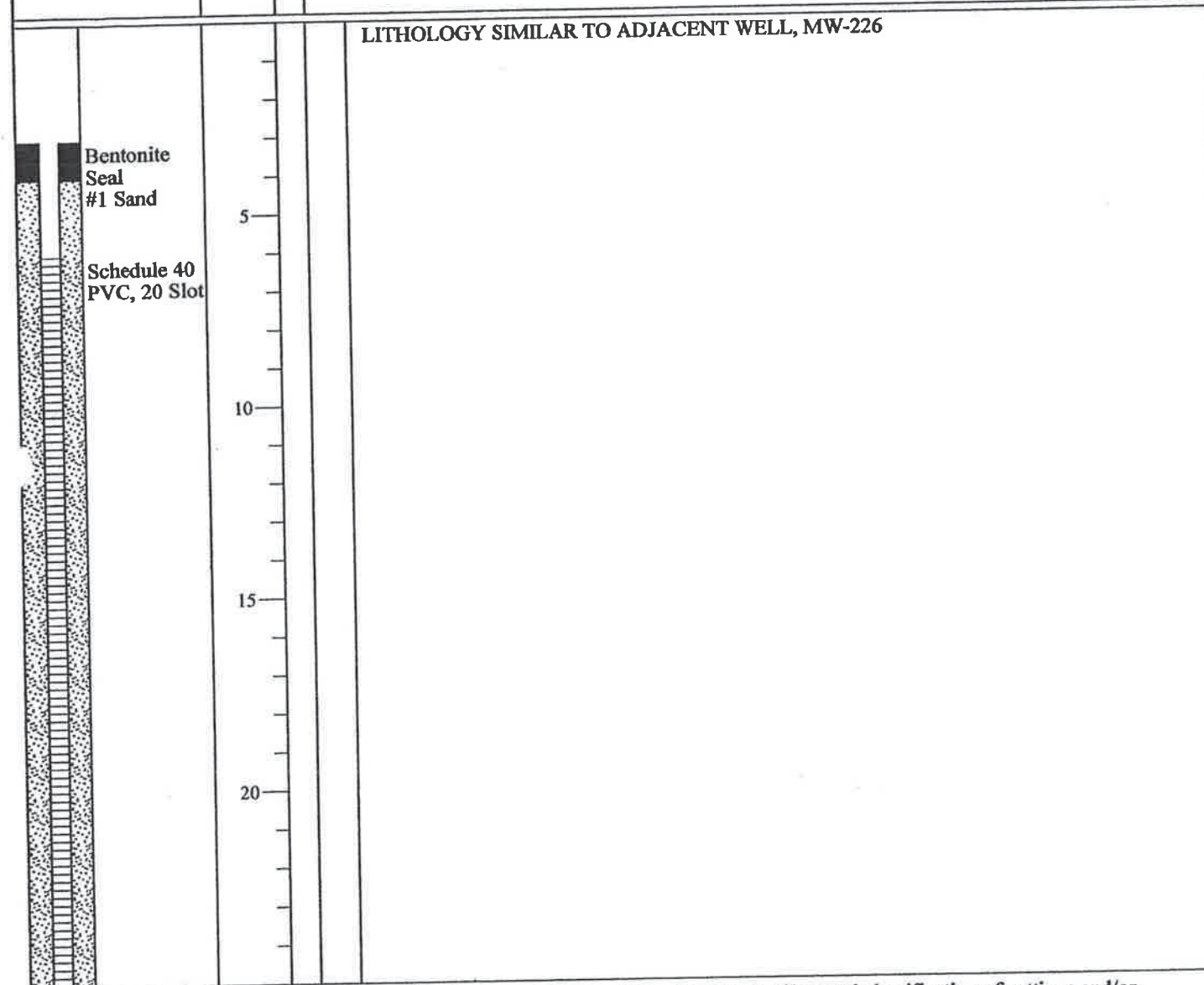
	Bottom Plug																																																																																																																																																																																																													
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International Incorporated

Logged By: CY	Date Drilled: 07/24/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA	Method/Equipment: Hollow Stem Auger Cuttings	Well Number: MW-223
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 26.0
				Drive wt. (lbs.):	Drop Dist. (in.):

Well Construction	Depth, (ft.)	Sample Type	Description
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The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **62SU.01009.02**

Date **2002**

Log of Well


PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

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SECOR

International Incorporated

Logged By: CY	Date Drilled: 07/24/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Cuttings		Well Number: MW-223	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 26.0	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth (ft.)	Sample Type	Description					
 Bottom Plug	30 35 40 45							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. **62SU.01009.02**

Date **2002**

Log of Well

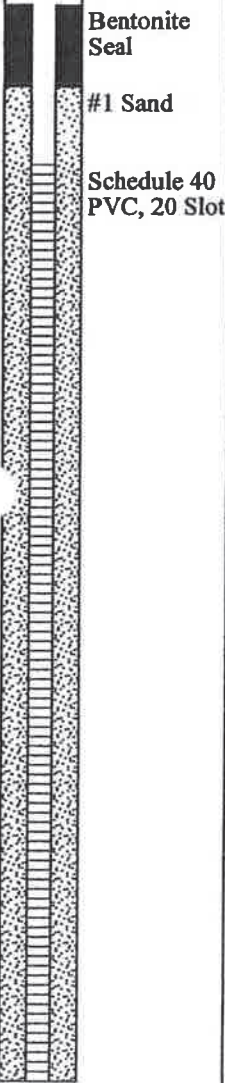
PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 07/23/02	Drilling Contractor: Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA	Method/Equipment: Hollow Stem Auger Cuttings	Well Number: MW-224
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 24.5
		Drive wt.(lbs.):	Drop Dist.(in.):		
Well Construction	Depth, (ft.)	Sample Type	Description		
			LITHOLOGY SIMILAR TO ADJACENT WELL, MW-225		
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>					

Project No. **62SU.01009.02**

Date **2002**

Log of Well

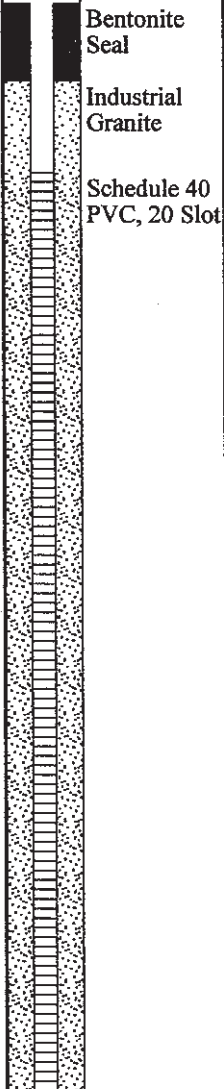
PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

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SECOR

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Logged By:	Date Drilled:	Drilling Contractor	Project Name:		Method/Equipment:		Well Number:	
CY	07/24/02	Parratt-Wolff, Inc.	Sunoco, Inc. Marcus Hook Refinery, PA		Hollow Stem Auger Split Spoon		MW-225	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.):	Surface Elev.(ft.):	Groundwater Depth (ft.):		Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
		6				30.0		
Well Construction		Depth, (ft.)	Sample Type	Description			Recovery	PID Reading (ppm)
				FILL; silt and gravel, some fine to medium sand, brown, dry.			1.0	16.1
				FILL; silt and gravel, some fine to medium sand, brown, dry.			1.7	15.5
				FILL; silt and gravel, some fine to medium sand, brown, dry.			1.3	11.4
				FILL; silt and gravel, some fine to medium sand, brown, dry.			1.7	16.9
				FILL; silt and gravel, some fine to medium sand, brown, dry.			1.3	14.5
		5		SILT; little fine sand, gray with some orange-brown spotting, dry.				10.2
				STONE			0.4	7.4
				SILT; some fine to medium sand, some gravel, trace clay, greenish-gray/brown, dry.				7.4
				SAND, fine to medium AND SILT; little gravel, brown, dry.			2.0	10.5
				SILT; some fine sand, trace clay, greenish-gray, dry.				88.9
				SILT; little fine to medium sand, little clay, grayish-brown, little moisture, slight odor. PID reading of 88.9 ppm from 13.8 to 14 feet.			2.0	146
		15		SILT; some fine to medium sand, some gravel, some clay, greenish-gray/grayish-brown/brown, moist, odor.				
				SILT; little clay, dark gray/black, moist, odor. One 0.1 foot black cobble piece within recovery.			1.3	83.6
				SILT AND CLAY; black, dry.				54.7
				SAND, fine AND SILT; some medium sand, trace gravel, dark brown, dry, tight.			2.0	77.8
				SILT AND SAND, fine to medium; black, dry.				47.6
				SILT; little clay, black, moist, odor.				47.6
		20		SILT; little gravel, little fine sand, little clay, grayish-brown, moist, odor.				49.8
				SAND, fine to medium AND SILT; some coarse sand, grayish-brown, moist, odor.			0.8	48.6
				SILT; some clay, little gravel, little fine sand, black, moist, odor.				42.0
				SILT; some fine to medium sand, some gravel, some clay, gray, moist, odor.			2.0	30.1
				SILT; some clay, some fine sand, little medium sand, gray with pinkish specks, little product observed. Clay lens at 23.5 to 23.54 feet, 23.67 to 23.70 feet and 23.75 to 23.79 feet.				
				SILT; some fine sand, some clay, little medium sand, gray with pinkish specks,			2.0	36.6
The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.								

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date June 2002

Log of Well

PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 2)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 07/24/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-225		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 6	Surface Elev.(ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					Recovery	PID Reading (ppm)
	30 35 40 45		wet, product.					2.0	36.6 36.3
			CLAY; plastic between stratigraphic layers, dark gray, product. CLAY; gray, product. Plastic at 27.7 feet.						
			CLAY; trace fine sand, gray, product.					1.0	
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Project No. **62SU.01009.02**

Date **June 2002**

Log of Well

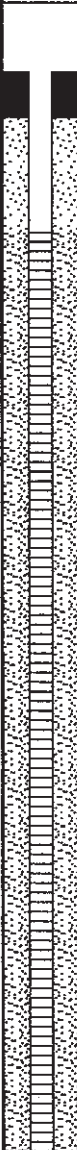
PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR

International Incorporated

Logged By: CY	Dates Drilled: 07/24/02 07/25/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-226		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 6	Surface Elev. (ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 30.0	Drive wt. (lbs.):	Drop Dist. (in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					Recovery	PID Reading (ppm)
			FILL; silt and gravel, some fine to medium sand, brown, dry.					0.8	12.2
			FILL; silt, some gravel, some fine to medium sand, brown, dry.					0.7	9.5
			FILL; silt and gravel, some fine to medium sand, brown, moist.					1.5	148
			NO RECOVERY					0	
			SILT AND CLAY; some fine to medium sand, some gravel, grayish-brown, moist, odor.					1.0	16
			SILT AND CLAY; little gravel, little fine to medium sand, grayish-brown, moist, odor.					2.0	12.4
			SILT AND CLAY; some fine to medium sand, little gravel, grayish-brown/greenish-brown/brown/dark brown, moist to wet, odor.					2.0	5.3
			SILT AND CLAY; some fine to medium sand, little gravel, grayish-brown/greenish-brown/brown/dark brown, moist to wet, odor.					2.0	6.4
			SAND, fine to medium AND SILT; little gravel, dark brown/black, dry.					2.0	50.1
			SILT; some fine sand, little clay, trace sand, trace gravel, gray-brown, moist, odor.						8.6
			SILT; some fine sand, little clay, trace sand, trace gravel, blackish-brown, moist, odor.						8.6
			SILT; some fine sand, little clay, trace sand, trace gravel, blackish-brown, moist, odor.					0.8	9.2
			SILT; some fine sand, some clay, little medium sand, gray with pink specks, moist, odor.						8.7
			SILT; some fine sand, some clay, little medium sand, gray with pink specks, moist, odor.						8.4
			SILT; little fine sand, little clay, gray-brown/light brown, moist, odor.					1.2	9.7
		SILT; some clay, little fine to medium sand, little gravel, brown, dry.							
		SAND, fine to medium AND SILT; little clay, little gravel, brown, wet, heavy product thickness at 21.5 feet.							
		SAND, fine to coarse; some silt, brown with whitish specks, wet.					1.2	12.2	
		SILT; some fine to medium sand, little sand, dark brown, wet, product.						70.4	
		SILT; some fine sand, little clay, trace gravel, dark gray, wet.					1.0	39.6	

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Project No. 62SU.01009.02

Date June 2002

Log of Well

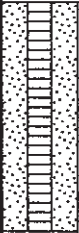

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LOG OF BOREHOLE

Figure

(sheet 1 of 2)

SECOR

International Incorporated

Logged By: CY	Dates Drilled: 07/24/02 07/25/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: MW-226		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 6	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):		
Well Construction	Depth, (ft.)	Sample Type	Description					Recovery	PID Reading (ppm)
	30		SILT; some fine to medium sand, little clay, trace gravel, dark gray, wet.					1.7	21.6
			SILT; some fine to medium sand, little clay, trace gravel, dark gray, wet.					1.3	30.4
			SILT AND SAND, fine to medium; some gravel, trace clay, gray, wet.						30.4
	35								
	40								
	45								

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Project No. **62SU.01009.02**

Date **June 2002**

Log of Well

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LOG OF BOREHOLE

Figure

(sheet 2 of 2)

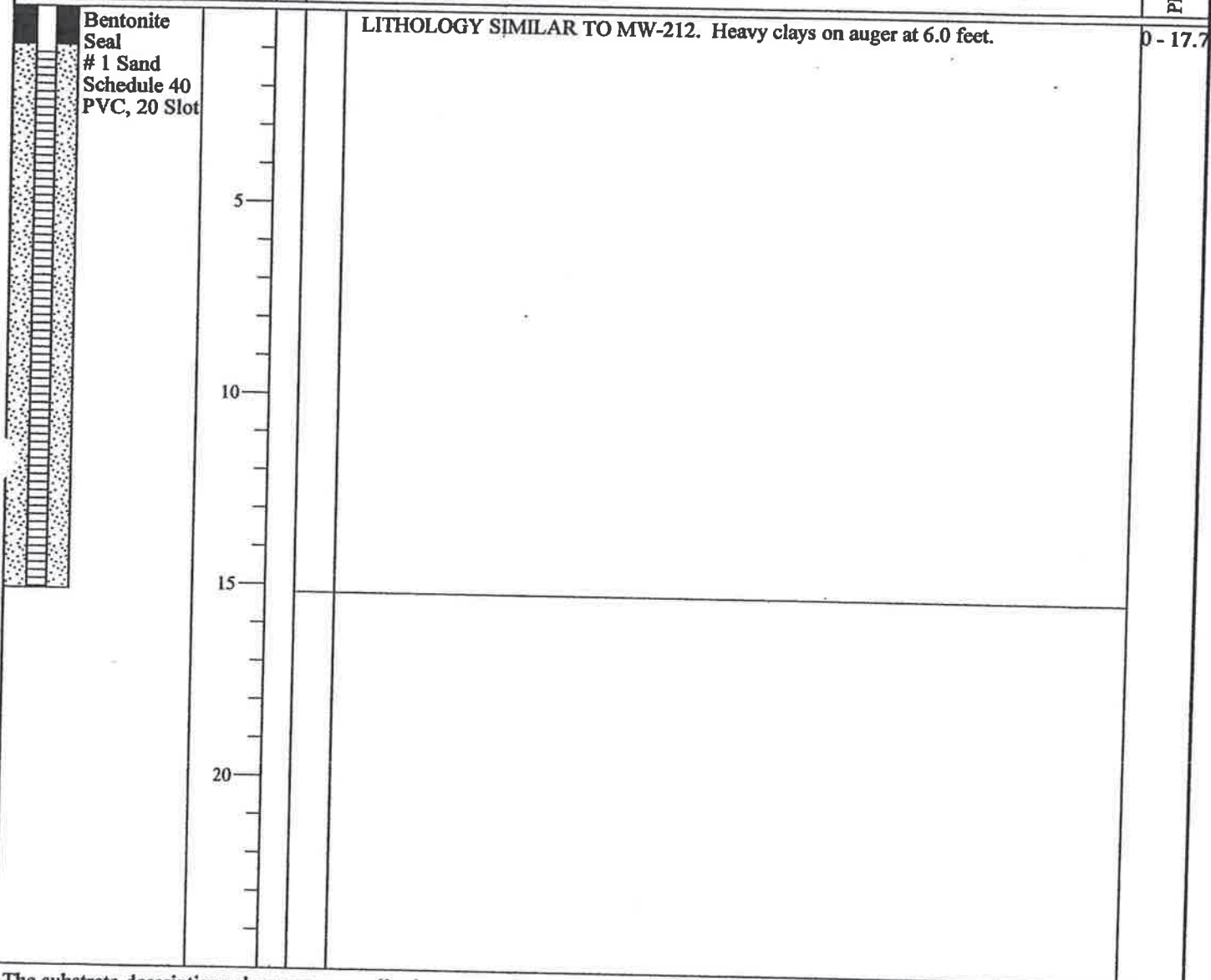
SECOR

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MW-240

Logged By: CY	Date Drilled: 08/28/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc.	Method/Equipment: Hollow Stem Auger	Well Number: a
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 15.2
				Drive wt. (lbs.):	Drop Dist. (in.):

Well Construction	Depth, (ft.)	Sample Type	Description	PID Reading (ppm)
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The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **62SU.01009.02**

Date **2002**

Log of Well

PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

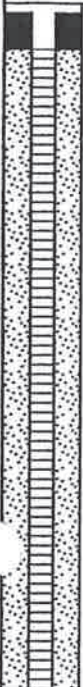
Figure

(sheet 1 of 1)

SECOR

International Incorporated

MW-241

Logged By: CY	Date Drilled: 08/28/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger		Well Number: b	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 15.0	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					PID Reading (ppm)
	5		LITHOLOGY SIMILAR TO MW-213. Soil on auger is covered with product.					0 - 20.1
	10							
	15							
	20							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01009.02


Date 2002

Log of Well

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LOG OF BOREHOLE

Figure

(sheet 1 of 1)

Logged By: CY	Date Drilled: 08/28/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger		Well Number: c	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 15.4	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					PID Reading (ppm)
			LITHOLOGY SIMILAR TO MW-211. Heavy clay on auger.					0 - 19.2
	5 10 15 20							

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Log of Well

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LOG OF BOREHOLE

Figure

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Logged By: CY	Date Drilled: 08/28/02	Drilling Contractor: Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger		Well Number: e	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 4	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 15.0	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					PID Reading (ppm)
	5 10 15 20		LITHOLOGY SIMILAR TO MW-214. Soil on auger was free of product.					0 - 19.4
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. **62SU.01009.02**

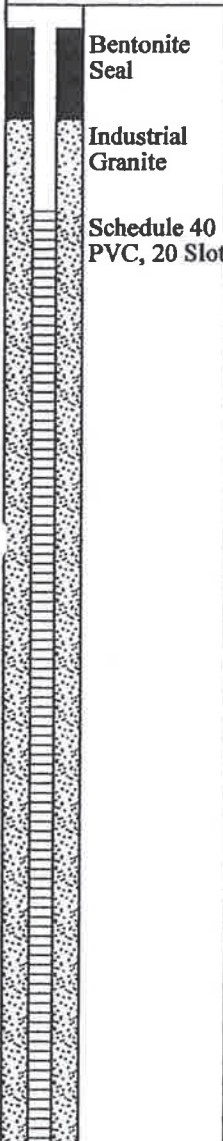
Date **2002**

Log of Well

PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 1)

Logged By:	Date Drilled:	Drilling Contractor	Project Name:		Method/Equipment:		Well Number:
CY	10/07/02	Parratt-Wolff, Inc.	Sunoco, Inc.		Hollow Stem Auger Split Spoon		f
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.):	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
		4			30.0		
Well Construction	Depth, (ft.)	Sample Type	Description			Recovery	PID Reading (ppm)
			SILT; some gravel/rock fragments, little fine to medium sand, dark brown, moist.			1.1	0.0
			SILT AND SAND, fine; some gravel, light brown, dry.			0.6	0.0
			WOOD FRAGMENT			2.0	0.0
	5		SILT; some gravel/rock fragment, some fine sand, dark brown, moist, plastic sheeting at 5.6'.				
			SILT AND GRAVEL/rock fragment; some brick fragments, some fine to medium sand, brown, moist.			2.0	0.0
			SILT; some fine to medium sand, little gravel, trace clay, dark brown, dry, petroleum hydrocarbon odor.				
			SILT AND SAND, fine; brown, little rock and brick fragments, moist.			2.0	0.0
			SAND, fine to medium AND SILT.				0.0
	10		SILT; little gravel, little fine to medium sand, trace clay, dark brown, moist, slight petroleum hydrocarbon odor.				0.0
			SILT; some gravel/rock fragments, some fine to medium sand, trace clay, brown, moist, slight petroleum hydrocarbon odor.			1.6	0.0
			SILT, brown AND CLAY, gray; little fine to medium sand, moist.			1.8	0.0
			ROCK FRAGMENTS.				0.0
			SILT; some clay, little fine to medium sand, dark brown, moist, petroleum hydrocarbon odor.				
	15		SILT AND SAND, fine to coarse; brown, moist, petroleum hydrocarbon odor.			2.0	0.0
			SAND, fine to medium AND SILT, black, tar-like, moist, petroleum hydrocarbon odor.				0.0
			SAND, fine to medium; some silt, brown, moist, presence of free product.			0.8	0.0
			SILT AND CLAY; little fine sand, brownish gray, wet, petroleum hydrocarbon odor.				0.0
			SILT AND CLAY; little fine sand, gray, wet, presence of free product.				
			SILT AND CLAY; gray, wet, presence of free product.			0.6	0.0
	20		SILT; little clay, little fine to medium sand, wet, presence of free product			1.0	0.0
			SILT AND CLAY; gray, wet, presence of free product.			2.0	0.0
			SAND, fine to medium AND SILT; brown, wet, presence of free product, white, fibrous, silty material along side of spoon from 22.6-22.9.				0.0
			SILT AND CLAY; little gravel, gray, wet, presence of free product.				0.0
			SILT AND CLAY; little fine to coarse sand, little gravel, wet, petroleum			2.0	0.0
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Project No. 62SU.01009.02

Date 2002

Log of Well


PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 2)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 10/07/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: f	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt. (lbs.):	Drop Dist. (in.):	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PID Reading (ppm)
			hydrocarbon odor.					
			ROCK FRAGMENT stuck in tip of spoon, very little recovery.				0.1	0.0
			SILT and SAND, fine to medium; little clay, little gravel, grayish brown, wet, petroleum hydrocarbon odor.				0.9	0.0
	30							
	35							
	40							
	45							
<p>* PID was calibrated several times and properly reading calibration gas but sample readings did not validate olfactory observations.</p>								
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Project No. 62SU.01009.02


Date 2002

LIPS ISLAND.GPJ
LOG OF BOREHOLE

Log of Well

Figure

(sheet 2 of 2)

Logged By: CY	Date Drilled: 10/08/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc.		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: g		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):		Total Depth (ft.): 30.0	Drive wt. (lbs.):	Drop Dist. (in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					Recovery	PID Reading (ppm)
			SILT; some fine to coarse sand, little gravel, brown, dry.					0.7	0.0
			SILT AND SAND, fine to medium; little gravel, brown, dry. Rock stuck in tip of spoon.					0.2	0.0
	5		SILT; little fine to medium sand, little gravel, brown, dry, brick fragments.					0.8	0.0
			SILT; some fine to medium sand, little clay, gray, greenish gray and brown mottled, dry.					2.0	11.5
			SILT; some fine to medium sand, little gravel, trace clay, dark brown, dry, petroleum hydrocarbon odor.						30.0
	10		SILT; some fine to medium sand, little gravel, brown, dry, petroleum hydrocarbon odor.					1.8	
			SILT; some fine to medium sand, trace gravel, trace clay, moist, strong petroleum hydrocarbon odor.						116
			SILT AND SAND, fine; little gravel/rock fragment, moist, petroleum hydrocarbon odor.					0.4	
			SAND, fine to medium AND SILT; little gravel, little clay, moist, petroleum hydrocarbon odor.					0.5	
	15		SAND, fine to medium AND SILT; some coarse sand, some gravel, little clay, wet, presence of free product.					1.4	
			SAND, fine to medium AND SILT; some coarse sand, some gravel, little clay, wet, presence of free product.					1.0	
			SAND, fine to coarse; some silt; little clay, brown, wet, presence of free product.					1.7	
	20		SILT AND CLAY; some fine to medium sand, some gravel, dark gray, wet, presence of free product, newspaper pieces. Gravel layer at 19.1-19.2 and clay layer at 19.5-19.6.					1.0	35.8
			SILT AND CLAY; some gravel, little fine to medium sand, presence of free product.					2.0	213
		SILT AND CLAY; some fine to medium sand, little gravel, wet, presence of free product.					1.1	269	

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Project No. **62SU.01009.02**

Date **2002**

Log of Well


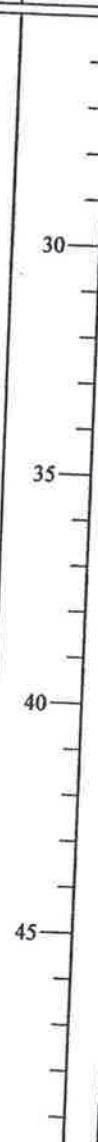


PHILIPS ISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 2)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 10/08/02	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Marcus Hook Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: g	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam. (in.): 4	Surface Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt. (lbs.):	Drop Dist. (in.):	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery	PTD Reading (ppm)
			of free product.				1.4	233
			SAND, fine to coarse; some silt, wet, presence of free product.					
			SILT AND SAND, fine to medium; some gravel, little clay, wet, presence of free product.					
			SILT; some fine to medium sand, some clay, trace gravel, gray, wet, presence of free product.					
	30		ROCK FRAGMENT; petroleum hydrocarbon staining on bottom of rock.				1.5	89.5
			SILT; some fine to medium sand, some clay, trace gravel, gray, wet, presence of free product.					

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Project No. **62SU.01009.02**

Date **2002**

Log of Well


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LOG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 10/20/03	Drilling Contractor: B.L. Myers	Project Name: Philips Island Marcus Hook, Pennsylvania		Method/Equipment: Hollow Stem Auger		Well Number: MW-256	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 8	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.6	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					PID Reading (ppm)
			Light brown-grayish brown SAND, fine to medium, some silt and gravel.					4.1
	5		Dark brown SILT, some fine to medium sand, little gravel, oily. A few pieces of plastic sheeting stained by oil coming up in the cuttings.					
	10		NOTE: Likely large voids in well column from gravel or rubble, had to use significantly more sand to set well.					
	12.8		Dark brown-black SILT, little fine to medium sand, little clay, wet/oily.					12.8
	15							
	20							
	25							
	30							
			Log developed from drill cuttings.					41.2
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well


PHILIPSISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: CY	Dates Drilled: 10/20/03 10/21/03	Drilling Contractor: B.L. Myers	Project Name: Philips Island Marcus Hook, Pennsylvania		Method/Equipment: Hollow Stem Auger		Well Number: MW-257	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 8	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					PID Reading (ppm)
			Brown SILT , some fine to medium sand, little gravel, trace clay.					0.8
			Brown SILT , some fine to medium sand, little gravel and clay.					4.5
	5							
	10		Black SILT , some clay and fine to medium sand.					10.8
	15							
	20		Black SILT , some clay, little fine sand, wet.					18.3
	25		Dark gray CLAY , some silt.					28.2
	30		Log developed from drill cuttings.					46.2

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well


PHILIPSISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 10/20/03	Drilling Contractor: B.L. Myers	Project Name: Philips Island Marcus Hook, Pennsylvania		Method/Equipment: Hollow Stem Auger		Well Number: MW-258	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 8	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.4	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					PID Reading (ppm)
			Brown-dark brown SILT and fine to medium sand, some gravel.					
	5							
			Dark brown-black SILT , little fine to medium sand, trace gravel, oily/wet.					10.2
	10		Gray CLAY , some silt, wet/oily.					17.8
	15							
	20							
	25							
	30							
			Log developed from drill cuttings.					35.4

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

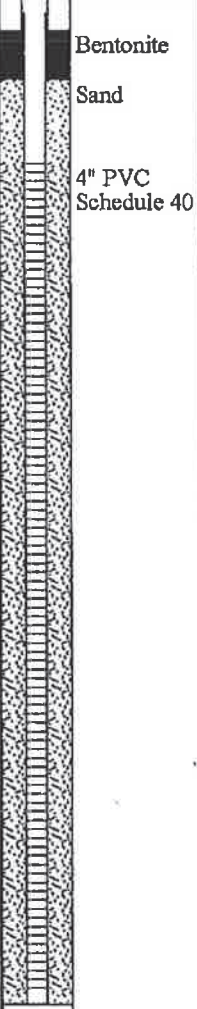
PHILIPSISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 10/21/03	Drilling Contractor: B.L. Myers	Project Name: Phillips Island Marcus Hook, Pennsylvania		Method/Equipment: Hollow Stem Auger		Well Number: MW-259	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 8	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.3	Drive wt.(lbs.):	Drop Dist.(in.):	
Well Construction	Depth, (ft.)	Sample Type	Description					PID Reading (ppm)
			Gray SILT .					
	5		Gray, fine to medium SAND , some silt.					
	10		Gray CLAY , some fine to medium sand and silt.					4.2
	20		Gray CLAY , little silt, oily.					
	30		Log developed from drill cuttings.					47.0

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

PHILIPSISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 10/21/03	Drilling Contractor: B.L. Myers	Project Name: Philips Island Marcus Hook, Pennsylvania	Method/Equipment: Hollow Stem Auger	Well Number: MW-260		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 8	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.8	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type	Description			PID Reading (ppm)	
	0		Brown and black SILT , some fine to medium sand, trace clay.				
	10		Black SILT , some fine to medium sand, little clay. Dark gray CLAY , little silt, oily.			0.2	
	20		Dark gray CLAY , little silt.			11.6	
	30		Log developed from drill cuttings.			1.8	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02 Date 03/19/2004

PHILIPSISLAND.GPJ
LOG OF BOREHOLE

Log of Well

Figure

(sheet 1 of 1)

SECOR

International Incorporated

Logged By: CY	Date Drilled: 10/21/03	Drilling Contractor: B.L. Myers	Project Name: Philips Island Marcus Hook, Pennsylvania	Method/Equipment: Hollow Stem Auger	Well Number: MW-261		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 8	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):

Well Construction	Depth, (ft.)	Sample Type	Description	PID Reading (ppm)
	0		Brown/tan, fine to medium SAND and SILT.	
	5		Gray SILT, some brown, fine to medium sand, some clay patches.	
	10		Black SILT, some clay and fine to medium sand.	8.4
	20		Gray CLAY, little silt, trace fine to medium sand.	21.7
	30		Log developed from drill cuttings.	4.5

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

PHILIPSISLAND.GPJ
LOG OF BOREHOLE

Figure

(sheet 1 of 1)

BORING LOGS

LOCATION: Sunoco Marcus Hook Refinery, Post Road
DATE: 17 January, 2000
GEOLOGIST: James Mulry, P.G.
DRILLER: B. L. Myers Bros., Inc., Glenmoore, PA
METHOD: Earthprobe®, 2" Core barrel
CONSTRUCTION: 5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5" Sch 40 PVC Pipe;

BORING B-59, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-3'	Slightly very fine sandy brown clay	Increasing and coarsening sand downward, gradational color change
3'-8'	Slightly clayey fine to medium gray sand	

AOI-5
 MW-01859

BORING B-60, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	1 gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down, gradational change to lower unit
6'-8'	Slightly clayey fine to medium gray sand	

AOI-5
 MW-01860

BORING B-61, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	gradational color change
2'-8'	Slightly very fine sandy gray clay	Increasing and coarsening sand down, gradational change to lower unit
6'-8'	Fine to medium gray sand	

AOI-5
 MW-01861

BORING LOGS

LOCATION: Sunoco Marcus Hook Refinery, Post Road
DATE: 17 January, 2000
GEOLOGIST: James Mulry, P.G.
DRILLER: B. L. Myers Bros., Inc., Glenmoore, PA
METHOD: Earthprobe®, 2" Core barrel
CONSTRUCTION: 5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5" Sch 40 PVC Pipe;

BORING B-59, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-3'	Slightly very fine sandy brown clay	Increasing and coarsening sand downward, gradational color change
3'-8'	Slightly clayey fine to medium gray sand	

A01-5
 MW-01d59

BORING B-60, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	1 gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down, gradational change to lower unit
6'-8'	Slightly clayey fine to medium gray sand	

A01-5
 MW-01d60

BORING B-61, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down, gradational change to lower unit
6'-8'	Fine to medium gray sand	

A01-5
 MW-01d61

BORING LOGS

LOCATION: Sunoco Marcus Hook Refinery, Post Road
DATE: 17 January, 2000
GEOLOGIST: James Mulry, P.G.
DRILLER: B. L. Myers Bros., Inc., Glenmoore, PA
METHOD: Earthprobe®, 2" Core barrel
CONSTRUCTION: 5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5" Sch 40 PVC Pipe;

BORING B-59, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-3'	Slightly very fine sandy brown clay	Increasing and coarsening sand downward, gradational color change
3'-8'	Slightly clayey fine to medium gray sand	

A01-5
 MW-01259

BORING B-60, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	1 gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down, gradational change to lower unit
6'-8'	Slightly clayey fine to medium gray sand	

A01-5
 MW-01260

BORING B-61, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down, gradational change to lower unit
6'-8'	Fine to medium gray sand	

A01-5
 MW-01261

BORING LOGS

LOCATION: Sunoco Marcus Hook Refinery, Post Road
DATE: 17 January, 2000
GEOLOGIST: James Mulry, P.G.
DRILLER: B. L. Myers Bros., Inc., Glenmoore, PA
METHOD: Earthprobe®, 2" Core barrel
CONSTRUCTION: 5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5" Sch 40 PVC Pipe;

BORING B-62, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down, gradational change to lower unit
6'-8'	Fine to medium gray sand	

AOI-5
 MW-01d B62

BORING B-63, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-3'	Slightly very fine sandy brown clay	
3'-7'	Slightly very fine sandy brown clay	Increasing and coarsening sand down, gradational change to lower unit
7'-8'	Clayey fine to medium gray sand	

AOI-5
 MW-01d B63

4" OBSERVATION WELL AT BORING B-16, TOTAL DEPTH 9'		
DEPTH	DESCRIPTION	COMMENTS
0-4'	Slightly very fine sandy gray clay	
4'-8'	Clayey fine to medium gray sand	Increasing and coarsening sand downward, gradational change
8'-9'	Weathered gneiss	Refusal at 9'

AOI-4
 RW-147

BORING LOGS

LOCATION: Sunoco Marcus Hook Refinery, Post Road
DATE: 17 January, 2000
GEOLOGIST: James Mulry, P.G.
DRILLER: B. L. Myers Bros., Inc., Glenmoore, PA
METHOD: Earthprobe®, 2" Core barrel
CONSTRUCTION: 5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5" Sch 40 PVC Pipe;

BORING B-62, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down, gradational change to lower unit
6'-8'	Fine to medium gray sand	

AOI-5
 MW-Old B62

BORING B-63, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-3'	Slightly very fine sandy brown clay	
3'-7'	Slightly very fine sandy brown clay	Increasing and coarsening sand down, gradational change to lower unit
7'-8'	Clayey fine to medium gray sand	

AOI-5
 MW-Old B63

4" OBSERVATION WELL AT BORING B-16, TOTAL DEPTH 9'		
DEPTH	DESCRIPTION	COMMENTS
0-4'	Slightly very fine sandy gray clay	
4'-8'	Clayey fine to medium gray sand	Increasing and coarsening sand downward, gradational change
8'-9'	Weathered gneiss	Refusal at 9'

AOI-4
 RW-147



MONITORING WELL LOG: MW-433

Page 1 of 1

PROJECT: Sunoco- Marcus Hook Refinery
SITE LOCATION: AOI-5
JOB NO.:
LOGGED BY: Luke Mokrycki
DATES DRILLED: 5/30/13 - 5/31/13
TOTAL DEPTH: 12.5'
DRILLING CO.: Lewis Environmental
DRILLING METHOD: Hydrovac truck
SAMPLING METHOD: Hand auger
SCREEN/RISER DIAMETER: 4"
WELLBORE DIAMETER: 14"
ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0			(0 - 2') Dark brown SILT and CLAY w/ small gravels	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 0.5' bgs	
280.6			(2' - 4') White and black, coarse SAND w/ some gray clay		PVC riser 0 - 1.0' bgs	
3.7			(4' - 6') Dark gray CLAY w/ small gravels		PVC screen from 1.0' - 12.5' bgs	
-5			(6' - 8') Dark gray - green CLAY	Sample taken at 8 to 10' bgs	Sand pack from 0.5' to 14' bgs	
8.7			(8' - 10') Brown - gray CLAY w/ small gravels			
14.8						
-10				Boring terminated at 14' bgs.		
66.8						



MONITORING WELL LOG: MW-434

Page 1 of 1

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/29/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 4.5'

ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0					Bentonite seal 0' - 0.5' bgs	
			(0 - 2') Brown and gray, clayey SILT	Sample taken at 0 to 2' bgs	PVC riser 0 - 1.0' bgs	
0.0						
			(2' - 4') Gray and black, coarse SAND and small rock chips		PVC screen from 1.0' - 4.5' bgs	
8.0						
			(4' - 6.5') Gray and black, coarse SAND		Sand pack from 0.5' to 6.5' bgs	
-5						
320.3				Sample taken at 6 to 6.5' bgs; noted on chain as 6-8'		



MONITORING WELL LOG: MW-435

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

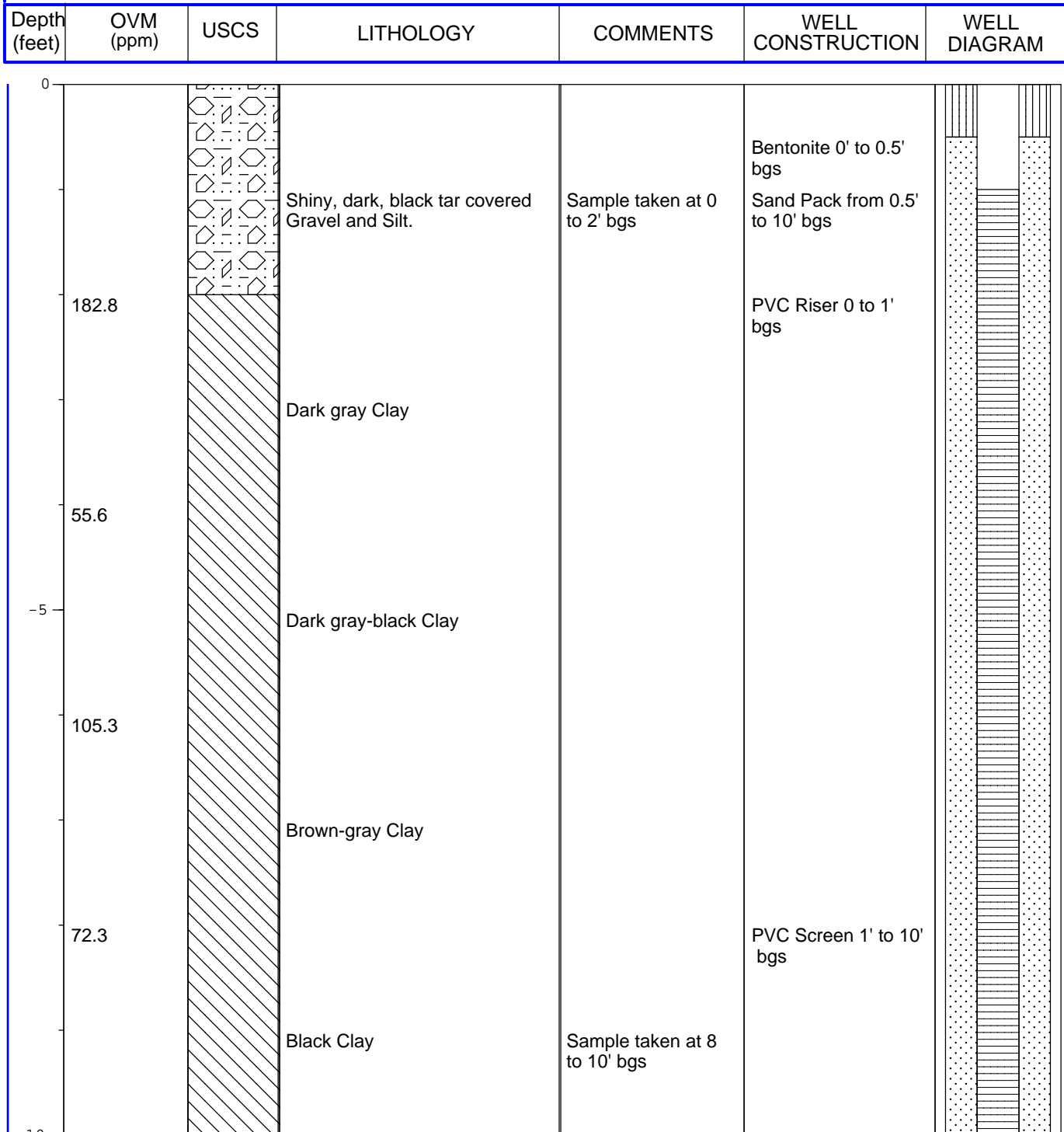
DATES DRILLED: 7/31/13 - 8/1/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 10'

ELEVATION:





MONITORING WELL LOG: MW-436

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environ.

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/14/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 5'

ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
			Light brown clay, loose w small gravels.	Sample taken at 0 to 2' bgs	Bentonite seal 0 to 1' bgs PVC riser 0 tp 1' bgs	
10.5			Brown and gray, fine sands (oily sheen)	Sample taken at 4 to 6' bgs	PVC screen 1 to 5' bgs	
81			Brown sands, wet, oily sheen.	Hydroexcavated to 6' bgs		
-5			Bedrock	Refusal due to bedrock at 6' bgs	Sand Pack 1 to 5' bgs	



MONITORING WELL LOG: MW-437

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environ./Total Quality Drilling
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck/Hollow stem auger
JOB NO.:		SAMPLING METHOD:	Hand auger/Split spoon
LOGGED BY:	Luke Mokrycki/Noelle Stroik	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/27/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	8'	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
			Light brown-tan fine Sand w/ small gravels.	Sample taken at 0 to 2' bgs	PVC Riser 0 to 1' bgs	
167			Medium brown, Silty Clay.	Sample taken at 6 to 8' bgs		
218			Dark brown - red, fine Sands (Oily Sheen)		Sand Pack from 1' to 8' bgs	
-5						
220			Gray Sands and brown Silt, wet.	Hydroexcavated to 8' bgs		
				Refusal due to bedrock at 8' bgs	PVC Screen 1' to 8' bgs	



MONITORING WELL LOG: MW-438

Page 1 of 1

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environ./Total Quality Drilling
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck/Hollow stem auger
JOB NO.:		SAMPLING METHOD:	Split spoon
LOGGED BY:	Noelle Stroik	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/27/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	14.5'	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
281			(0 - 2') Fine brown Sands with small Gravels	Sample taken at 0 to 2' bgs	PVC Riser 0 to 0.5' bgs, plus stick-up	
2999			(2' - 4') Fine, dark gray Sands	Sample taken at 4 to 6' bgs		
-5			(4' - 6') Fine dark gray Sands		Sand Pack from 0.3' to 15' bgs	
2999/OVR			(6' - 8') Medium brown, sandy Clay; small Gravels, Strong odor.		PVC Screen 0.5' to 14.5' bgs	
105.7			(8' - 10') Rusty orange Silt and dark brown Sands, wet.	Hydroexcavated to 10' bgs		
-10			(10' - 12') Brown, orange brown, gray, black Sandy Silt w/ some gravel, moist, slight Pero-like odor.	Sample taken at 8 to 10' bgs		
220.6			(12' - 14') Same as above.	HSA from 10' - 15' bgs		
56.2			(14' - 15') Brown, orange brown Sandy Silt, little Clay, moist, no odor.	Boring terminated at 15' bgs.		
28.7						
-15						

Project Marcus Hook Industrial Complex			Project No. 2574601			
Location AOI5			Elevation And Datum 10.827			
Drilling Agency Lewis Environmental			Date Started 5/8/13		Date Finished 5/8/13	
Drilling Equipment Hydrovac Truck			Driller Paul Riale			
Size And Type of Bit 10 inch			Inspector Patrick Troy			
Method of Installation Hydrovac excavate to 12' bgs. Install 10 foot 4" diameter screen and 2 foot 4" diameter riser. Backfill annulus of well with filter sand to 1' bgs. Install bentonite hole plug seal to grade.						
Method of Well Development				Note Initial 10 foot screen, 11 foot filter pack, 1 foot bentonite seal, 4 foot riser. Adjusted by Aquaterra to 10 foot screen, 10 foot filter, concrete pad at surface.		
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand			
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite			
Borehole Diameter 18"			Type of Filter Material Filter Sand			
Top of Casing	Elevation 14.91'	Depth 4.09' ags		Well Details	Soil / Rock Classification	Depth (ft)
Top of Seal	Elevation	Depth		← Concrete Pad	sandy SILT, dark grey, odor	1
Top of Filter	Elevation 10.83'	Depth 0' bgs		← Filter Sand		
Top of Screen	Elevation 10.58'	Depth 0.25' bgs			Clayey SILT, some cobbles	2
Bottom of Filter	Elevation 0.83'	Depth 10' bgs				
Bottom of Well	Elevation	Depth 10' bgs				
Screen Length	9.8'	Slot Size 10 Slot				3
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)						4
Elevation	DTW	Date				5
Elevation	DTW	Date				6
Elevation	DTW	Date			7	
Elevation	DTW	Date			8	
Elevation	DTW	Date			9	
Elevation	DTW	Date				



MONITORING WELL LOG: MW-440

Page 1 of 1

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Luke Mokrycki	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	5/8/13 - 5/9/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	12'	ELEVATION:	

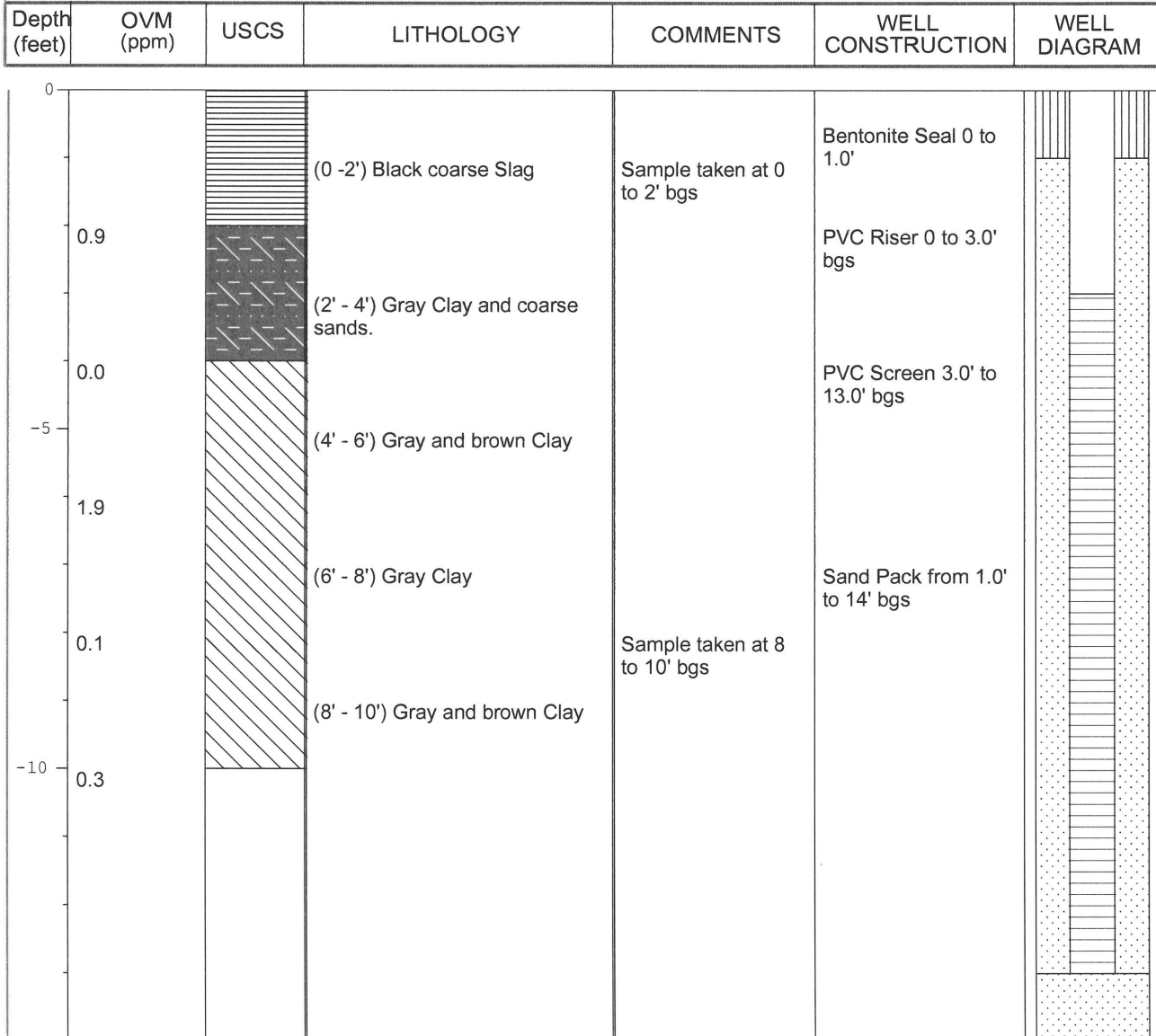
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0					Bentonite Seal 0 to 1.0'	
0.0			(0 - 2') Light Brown Clay and Small Gravels.	Sample taken at 0 to 2' bgs	PVC Riser 0 to 2.0' bgs	
14.2			(2' - 4') Dark Brown Clay and Coarse Sands with Small Gravels.		PVC Screen 2.0' to 12.0' bgs	
259			(4' - 6') Dark Gray and Tan Clayey Silt		Sand Pack from 1.0' to 12.5' bgs	
25.3			(6' - 8') Black and Tan Clay. moist.	Sample taken at 8 to 10' bgs		
332			(8' - 12.5') Brown-Green Clay.	Boring terminated at 12.5' bgs.		



MONITORING WELL LOG: MW-441

Page 1 of 1

PROJECT: Sunoco- Marcus Hook Refinery
SITE LOCATION: AOI-5
JOB NO.:
LOGGED BY: Luke Mokrycki
DATES DRILLED: 5/15/13
TOTAL DEPTH: 13'
DRILLING CO.: Lewis Environ.
DRILLING METHOD: Hydrovac truck
SAMPLING METHOD: Hand auger
SCREEN/RISER DIAMETER: 4"
WELLBORE DIAMETER: 10"
ELEVATION:





MONITORING WELL LOG: MW-442

Page 1 of 1

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Evan Ellewanger

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/29/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 12'

ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-----------------	--------------	------	-----------	----------	----------------------	-----------------

0			(0 - 2') dark brown / green silty CLAY, gravels, dry	Sample taken at 0 to 2' bgs *no odor	Bentonite seal 0' - 0.1' bgs	
0.2						
			(2' - 4') brown / tan clayey SILT, fine gravel; slightly moist	*slight odor		
5.2						
-5			(4' - 6') brown / tan, clayey SILT, very fine gravel; slightly moist	*slight odor		
5.3				Sample taken at 6 to 8' bgs	Sand pack from 0.1' to 16' bgs	
			(6' - 8') brown clayey - SILT, little, fine gravel; moist	*strong odor		
252						
			(8' - 10') brown silty CLAY, fine gravels, wet	*slight odor	PVC screen from 0' to 12' bgs	
-10	9.3					
-15						

Project Marcus Hook Industrial Complex			Project No. 2574601		
Location AOI5			Elevation And Datum 24.028		
Drilling Agency Lewis Environmental			Date Started 5/10/13		Date Finished 5/10/13
Drilling Equipment Hydrovac Truck			Driller Paul Riale		
Size And Type of Bit 10 inch			Inspector Patrick Troy		
Method of Installation Hydrovac excavate to 13.5' bgs. Install 10 foot 4" diameter screen and 5 foot 4" diameter riser. Backfill annulus of well with filter sand to 2' bgs. Install bentonite hole plug seal to grade.					
Method of Well Development				Note 10 foot screen, 4 inch diameter, 6 foot riser, 12 foot sand filter, 2 foot bentonite seal	
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand		
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite		
Borehole Diameter 18"			Type of Filter Material Filter Sand		
Top of Casing	Elevation 26.78'	Depth 2.75' ags	<p>Well Details</p> <p>← Bentonite</p> <p>← Filter Sand</p> <p>← Screen</p>	Soil / Rock Classification	Depth (ft)
Top of Seal	Elevation 24.03'	Depth 0' bgs		Sandy GRAVEL, dark grey	1
Top of Filter	Elevation 22.03'	Depth 2' bgs		Clayey SILT, trace subangular gravel	2
Top of Screen	Elevation 20.03'	Depth 4' bgs			3
Bottom of Filter	Elevation 10.03'	Depth 14' bgs			4
Bottom of Well	Elevation	Depth 14' bgs			5
Screen Length	10.0'	Slot Size 10 Slot			6
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)					7
					8
Elevation 14.01'	DTW 12.77'	Date 8/12/2013		silty GRAVEL, cobbles	9
Elevation	DTW	Date			10
Elevation	DTW	Date			11
Elevation	DTW	Date			12
Elevation	DTW	Date	silty SAND, some gravel	13	
Elevation	DTW	Date			



MONITORING WELL LOG: MW-444

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 7/30/13 - 7/31/13

WELLBORE DIAMETER:

14"

TOTAL DEPTH: 13'

ELEVATION:

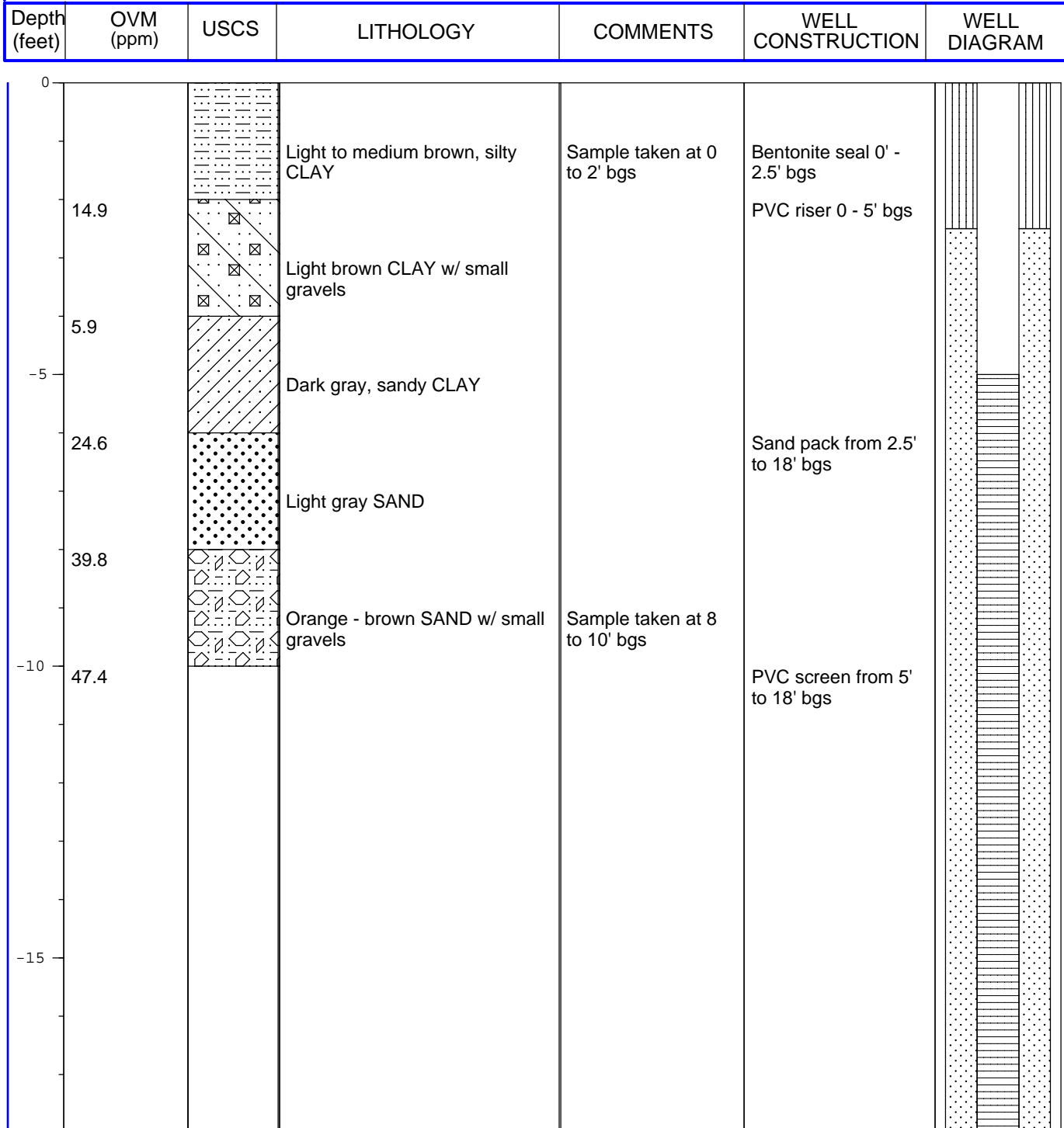
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
			dark brown CLAY, silt, and fill	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs	
1.8					PVC riser 0 - 2.5' bgs	
			light brown CLAY and silt			
39.2						
-5			light brown CLAY and silt			
131.5				Sample taken at 4 to 6' bgs	Sand pack from 2.0' to 13' bgs	
			light brown, clayey SILT			
7.5						
			brown and gray CLAY		PVC screen from 2.5' - 13' bgs	
-10						
4.5						

Project Marcus Hook Industrial Complex			Project No. 2574601		
Location AOI5			Elevation And Datum 20.941		
Drilling Agency Lewis Environmental			Date Started 5/14/2013		Date Finished 5/14/2013
Drilling Equipment Hydrovac Truck			Driller Paul Riale		
Size And Type of Bit 10 inch			Inspector Patrick Troy		
Method of Installation Hydrovac excavate to 15' bgs. Install 10 foot 4" diameter screen and 4 foot 4" diameter casing. Backfill annulus of well with filter sand to 2' bgs. Install bentonite hole plug seal to grade.					
Method of Well Development				Note 3.5 foot riser, 13 foot sand filter, 2 foot bentonite seal	
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand		
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite		
Borehole Diameter 18"			Type of Filter Material Filter Sand		
Top of Casing	Elevation 24.44'	Depth 3.5' ags		Soil / Rock Classification	Depth (ft)
Top of Seal	Elevation 20.94'	Depth 0' bgs		Fill	1
Top of Filter	Elevation 18.94'	Depth 2' bgs			2
Top of Screen	Elevation 15.94'	Depth 5' bgs			3
Bottom of Filter	Elevation 5.94'	Depth 15' bgs		USCS Low Plasticity Clay	4
Bottom of Well	Elevation	Depth 15' bgs			5
Screen Length	10.0'	Slot Size 10 Slot			6
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)				USCS Low Plasticity Clay	7
Elevation 20.14'	DTW 4.3'	Date 8/12/2013			8
Elevation	DTW	Date		Fill	9
Elevation	DTW	Date		10	
Elevation	DTW	Date		11	
Elevation	DTW	Date		12	
Elevation	DTW	Date		13	
Elevation	DTW	Date		14	



MONITORING WELL LOG: MW-446

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Luke Mokrycki & Evan Ellwanger	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	5/28/13 & 5/29/15	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	18'	ELEVATION:	





MONITORING WELL LOG: MW-447

Page 1 of 1

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/16/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 14'

ELEVATION:

Depth (feet)	OMV (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
			(0 - 2') Dark brown clay and gravel	Sample taken at 0 to 2' bgs	Bentonite seal 0' to 3' bgs	
50.8			(2' - 4') Dark gray clay		PVC Riser 0 to 4' bgs	
70.7			(4' - 6') Dark gray clay			
-5						
50.4			(6' - 8') Dark gray sand (fine), moist.		Sand Pack from 3' to 15' bgs	
50.8			(8' - 10') Coarse, dark brown sands, oily sheen, wet.	Sample taken at 8 to 10' bgs	PVC Screen 4' to 14' bgs	
-10						
65.9						
-15						

Project Marcus Hook Industrial Complex			Project No. 2574601		
Location AOI5			Elevation And Datum 17.157		
Drilling Agency Lewis Environmental			Date Started 5/20/2013		Date Finished 5/20/2013
Drilling Equipment Hydrovac Truck			Driller Paul Riale		
Size And Type of Bit 10 inch			Inspector Patrick Troy		
Method of Installation Hydrovac excavate to 12.5' bgs. Install 9 foot 4" diameter screen and 3.5 foot 4" diameter casing. Backfill annulus of well with filter sand to 2' bgs. Install bentonite hole plug seal to grade.					
Method of Well Development				Note 2 foot riser, 10.5 foot sand filter, 2 foot bentonite seal	
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand		
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite		
Borehole Diameter 18"			Type of Filter Material Filter Sand		
Top of Casing	Elevation 19.16'	Depth 2' ags			Depth (ft)
Top of Seal	Elevation 17.16'	Depth 0' bgs			
Top of Filter	Elevation 15.16'	Depth 2' bgs			
Top of Screen	Elevation 13.66'	Depth 3.5' bgs			
Bottom of Filter	Elevation 4.66'	Depth 12.5' bgs			
Bottom of Well	Elevation	Depth 12.5' bgs			
Screen Length	9.0'	Slot Size 10 Slot			
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)					
Elevation 10.46'	DTW 8.7'	Date 8/12/2013			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			



MONITORING WELL LOG: MW-449

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

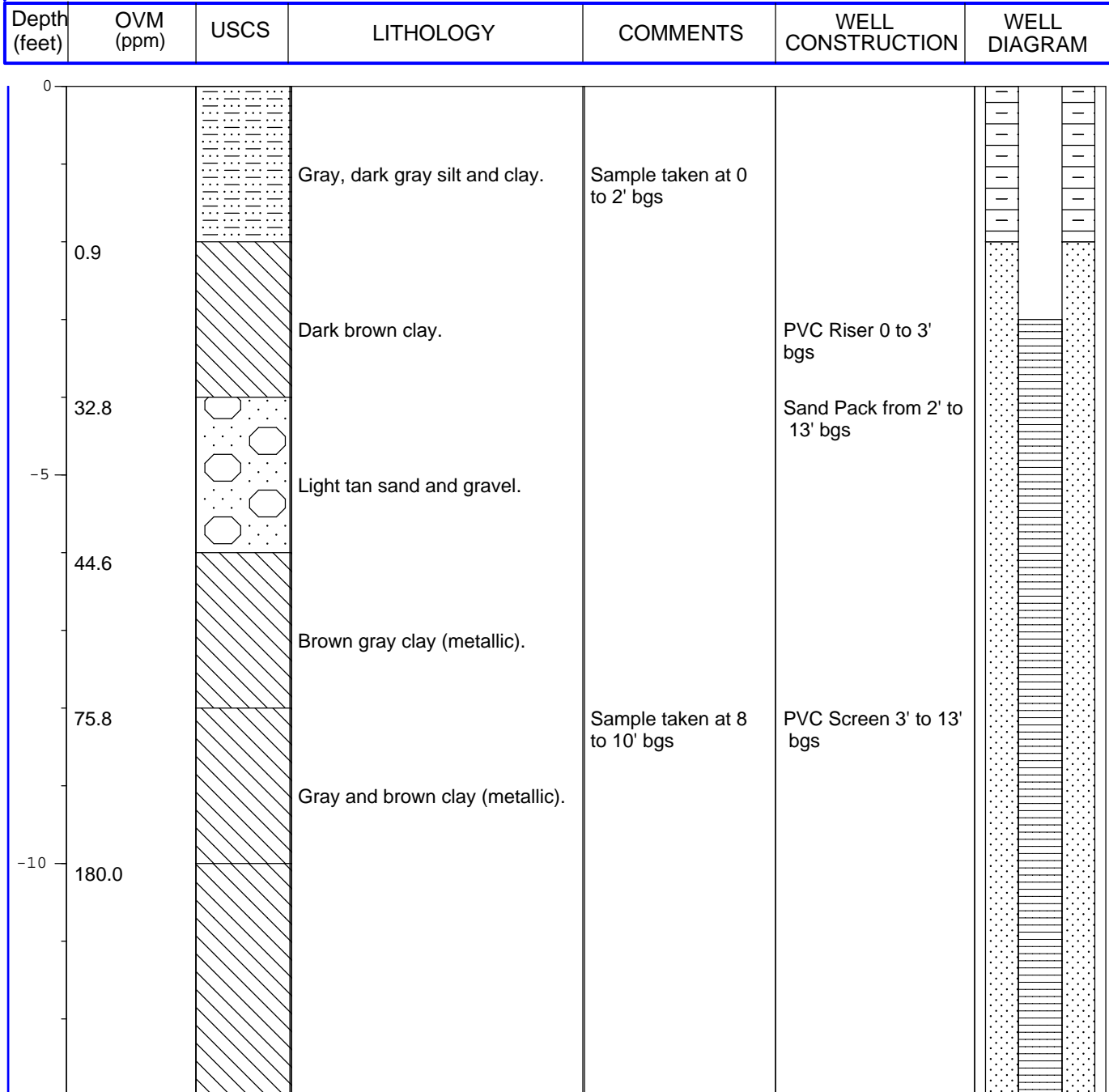
DATES DRILLED: 5/16/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 13'

ELEVATION:

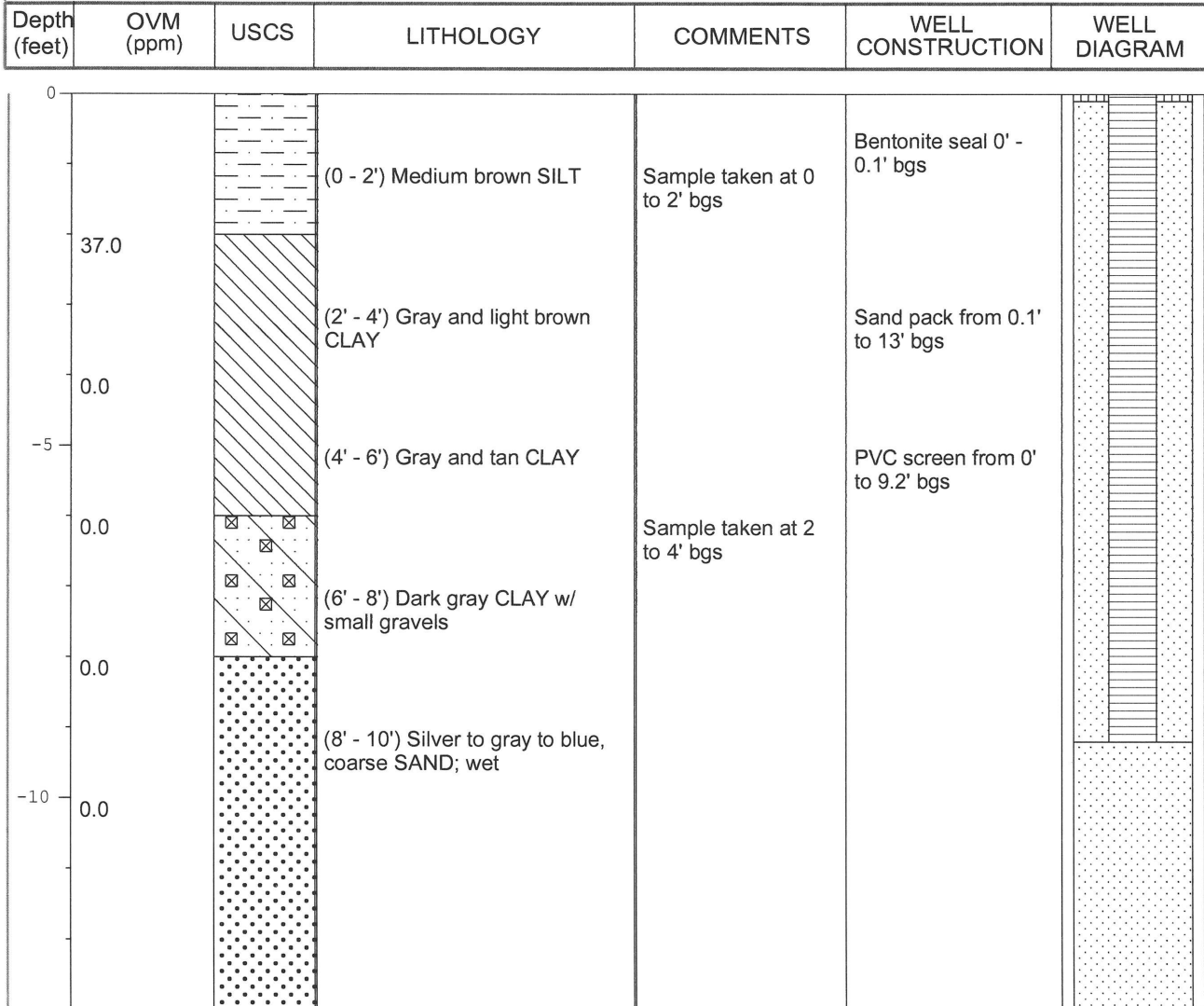




MONITORING WELL LOG: MW-450

Page 1 of 1

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Luke Mokrycki	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	5/24/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	9.2'	ELEVATION:	



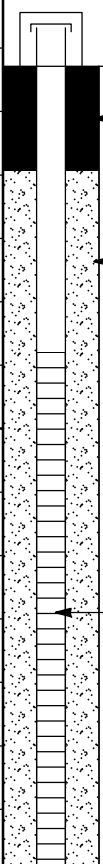


MONITORING WELL LOG: MW-451

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Yavuz Gungor (boring); Evan Ellewanger (well)	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	5/24/13; 5/28/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	15'	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
1.5			Brown silty fine to coarse SAND with fine to coarse angular gravel (wet)	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.5' bgs PVC riser 0 - 3' bgs	
74.8			Brown silty fine to coarse SAND with fine to coarse angular gravel (wet)			
-5			Gray-green fine sandy SILT, trace gravel (moist)			
474.4			Brown SILT, trace fine sand (wet)	Sample taken at 8 to 10' bgs	Sand pack from 2.5' to 15' bgs	
184.5			Brown, gray clayey SILT (dry-moist)		PVC screen from 3' to 15' bgs	
-10						
46.7						
-15				Langan ended hole @ 12'. AT returned to re-clear and install well.		

Well No. MW-452

Project Marcus Hook Industrial Complex			Project No. 2574601		
Location AOI5			Elevation And Datum 22.685		
Drilling Agency Lewis Environmental			Date Started 5/24/2013		Date Finished 5/24/2013
Drilling Equipment Hydrovac Truck			Driller Paul Riale		
Size And Type of Bit 10 inch			Inspector Patrick Troy		
Method of Installation Hydrovac excavate to 15.5' bgs. Install 10 foot 4" diameter screen and 10 foot 4" diameter riser. Backfill annulus of well with filter sand to 2' bgs. Install bentonite hole plug seal to grade.					
Method of Well Development				Note 3 foot riser, 13.5 foot sand filter, 2 foot bentonite seal	
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand		
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite		
Borehole Diameter 18"			Type of Filter Material Filter Sand		
Top of Casing	Elevation 25.69'	Depth 3' ags	 <div>Well Details</div> <div>← Bentonite</div> <div>← Filter Sand</div> <div>← Screen</div>	Soil / Rock Classification	Depth (ft)
Top of Seal	Elevation 22.69'	Depth 0' bgs		USCS Silt	1
Top of Filter	Elevation 20.69'	Depth 2' bgs			2
Top of Screen	Elevation 17.19'	Depth 5.5' bgs			3
Bottom of Filter	Elevation 7.19'	Depth 15.5' bgs		USCS Low Plasticity Silty Clay	4
Bottom of Well	Elevation	Depth 15.5' bgs		USCS Silt	5
Screen Length	10.0'	Slot Size 10 Slot			6
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)				USCS Well-graded Sand	7
Elevation 15.17'	DTW 10.52'	Date 8/12/2013			8
Elevation	DTW	Date			9
Elevation	DTW	Date		10	
Elevation	DTW	Date		11	
Elevation	DTW	Date		12	
Elevation	DTW	Date		13	
Elevation	DTW	Date		14	
Elevation	DTW	Date		15	



MONITORING WELL LOG: MW-453

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Yavuz Gungor/ LANGAN	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	5/20/13	WELLBORE DIAMETER:	14"
TOTAL DEPTH:	13.67	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
0.0			Brown fine to coarse Sandy Silt, trace fine to coarse angular gravel (moist)	Sample taken at 1 to 2' bgs (lab)	Bentonite seal 0' - 2.0' bgs	
0.0			Grey Silt with some fine to coarse sand and fine to coarse gravel	Sample taken at 3 to 4' bgs Perched GW	PVC riser 0 - 3.67' bgs	
-5			Green Silt trace fine sand (moist)	Sample taken at 5 to 6' bgs		
20.9			Brown clayey Silt (moist-wet)		Sand pack from 2.0' to 13.67' bgs	
10.7			Brown fine sandy Silt, trace coarse sand (wet)		PVC screen from 3.67' - 13.67' bgs	
-10						



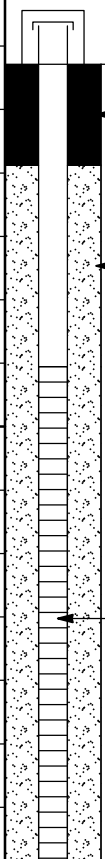
MONITORING WELL LOG: MW-454

Page 1 of 1

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental
SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck
JOB NO.: SAMPLING METHOD: Hand auger
LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"
DATES DRILLED: 5/17/13, 5/20/13 WELLBORE DIAMETER: 10"
TOTAL DEPTH: 15.5' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0					Bentonite 0' to 2' bgs	
1.3			Dark brown Clay and gravels	Sample taken at 0 to 2' bgs	PVC Riser 0 to 3' bgs	
2.7			Dark gray Clay		Sand Pack from 2' to 15.5' bgs	
-5			Dark gray Clay			
37.9			Dark gray Sand (fine); moist.			
31.3			Coarse, dark brown Sands, oily sheen; wet.	Sample taken at 8 to 10' bgs	PVC Screen 3' to 15.5' bgs	
-10	PID not available					
-15						

Well No. MW-455

Project Marcus Hook Industrial Complex			Project No. 2574601			
Location AOI5			Elevation And Datum 27.560			
Drilling Agency Lewis Environmental			Date Started 5/23/2013		Date Finished 5/23/2013	
Drilling Equipment Hydrovac Truck			Driller Paul Riale			
Size And Type of Bit 10 inch			Inspector Patrick Troy			
Method of Installation Hydrovac excavate to 16' bgs. Install 10 foot 4" diameter screen and 10 foot 4" diameter riser. Backfill annulus of well with filter sand to 2' bgs. Install bentonite hole plug seal to grade.						
Method of Well Development			Note 4 foot riser, 14 foot sand filter, 2 foot bentonite seal			
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand			
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite			
Borehole Diameter 18"			Type of Filter Material Filter Sand			
Top of Casing	Elevation 31.56'	Depth 4' ags	 <div>Well Details</div> <div>← Bentonite</div> <div>← Filter Sand</div> <div>← Screen</div>		Soil / Rock Classification	Depth (ft)
Top of Seal	Elevation 27.56'	Depth 0' bgs			Fill	1
Top of Filter	Elevation 25.56'	Depth 2' bgs			USCS Silt	2
Top of Screen	Elevation 21.56'	Depth 6' bgs			USCS Silt	3
Bottom of Filter	Elevation 11.56'	Depth 16' bgs			USCS Silt	4
Bottom of Well	Elevation	Depth 16' bgs			USCS Silt	5
Screen Length	10.0'	Slot Size 10 Slot			USCS Silty Sand	6
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)					USCS Silty Sand	7
Elevation 15.75'	DTW 15.81'	Date 8/12/2013			Fill	8
Elevation	DTW	Date				9
Elevation	DTW	Date		10		
Elevation	DTW	Date		11		
Elevation	DTW	Date		12		
Elevation	DTW	Date		13		
Elevation	DTW	Date		14		
Elevation	DTW	Date		15		

Project Marcus Hook Industrial Complex			Project No. 2574601		
Location AOI5			Elevation And Datum 23.291		
Drilling Agency Lewis Environmental			Date Started 5/21/13		Date Finished 5/21/13
Drilling Equipment Hydrovac Truck			Driller Paul Riale		
Size And Type of Bit 10 inch			Inspector Patrick Troy		
Method of Installation Hydrovac excavate to 14.5' bgs. Install 10 foot 4" diameter screen and 10 foot 4" diameter riser. Backfill annulus of well with filter sand to 2' bgs. Install bentonite hole plug seal to grade.					
Method of Well Development				Note 2 foot riser, 12.5 foot sand filter, 2 foot bentonite seal	
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand		
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite		
Borehole Diameter 18"			Type of Filter Material Filter Sand		
Top of Casing	Elevation 25.29'	Depth 2' ags			Well Details ←Bentonite ←Filter Sand ←Screen
Top of Seal	Elevation 23.29'	Depth 0' bgs			
Top of Filter	Elevation 21.29'	Depth 2' bgs			
Top of Screen	Elevation 18.79'	Depth 4.5' bgs			
Bottom of Filter	Elevation 8.79'	Depth 14.5' bgs			
Bottom of Well	Elevation	Depth 14.5' bgs			
Screen Length	10.0'	Slot Size 10 Slot			
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)					
Elevation 13.69'	DTW 11.6'	Date 8/12/2013			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			

Soil / Rock Classification		Depth (ft)
USCS Silt		1
USCS Silt		2
USCS Silt		3
USCS Silt		4
USCS Silt		5
Fill		6
USCS Silt		7
USCS Sandy Silt		8
USCS Sandy Silt		9
USCS Sandy Silt		10
USCS Sandy Silt		11
USCS Sandy Silt		12
USCS Sandy Silt		13
USCS Sandy Silt		14



MONITORING WELL LOG: MW-457

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Yavuz Gungor/ LANGAN

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/17/13

WELLBORE DIAMETER:

14"

TOTAL DEPTH: 12.91'

ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
3.9			Brown fine to coarse Sandy Silt, some clay and fine to coarse angular gravel (moist)	Sample taken at 0 to 1' bgs (lab)	Bentonite seal 0' - 2.0' bgs	
31.1			Olive-grey soft Silt (moist)	Sample taken at 2 to 3' bgs (lab)	PVC riser 0 - 2.91' bgs	
6.3				Black staining on sample		
27.7			Brown Silt some fine sand trace medium to coarse sand (wet)		Sand pack from 2.0' to 12.91' bgs	
-10					PVC screen from 2.91' - 12.91' bgs	



MONITORING WELL LOG: MW-458

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/22/13

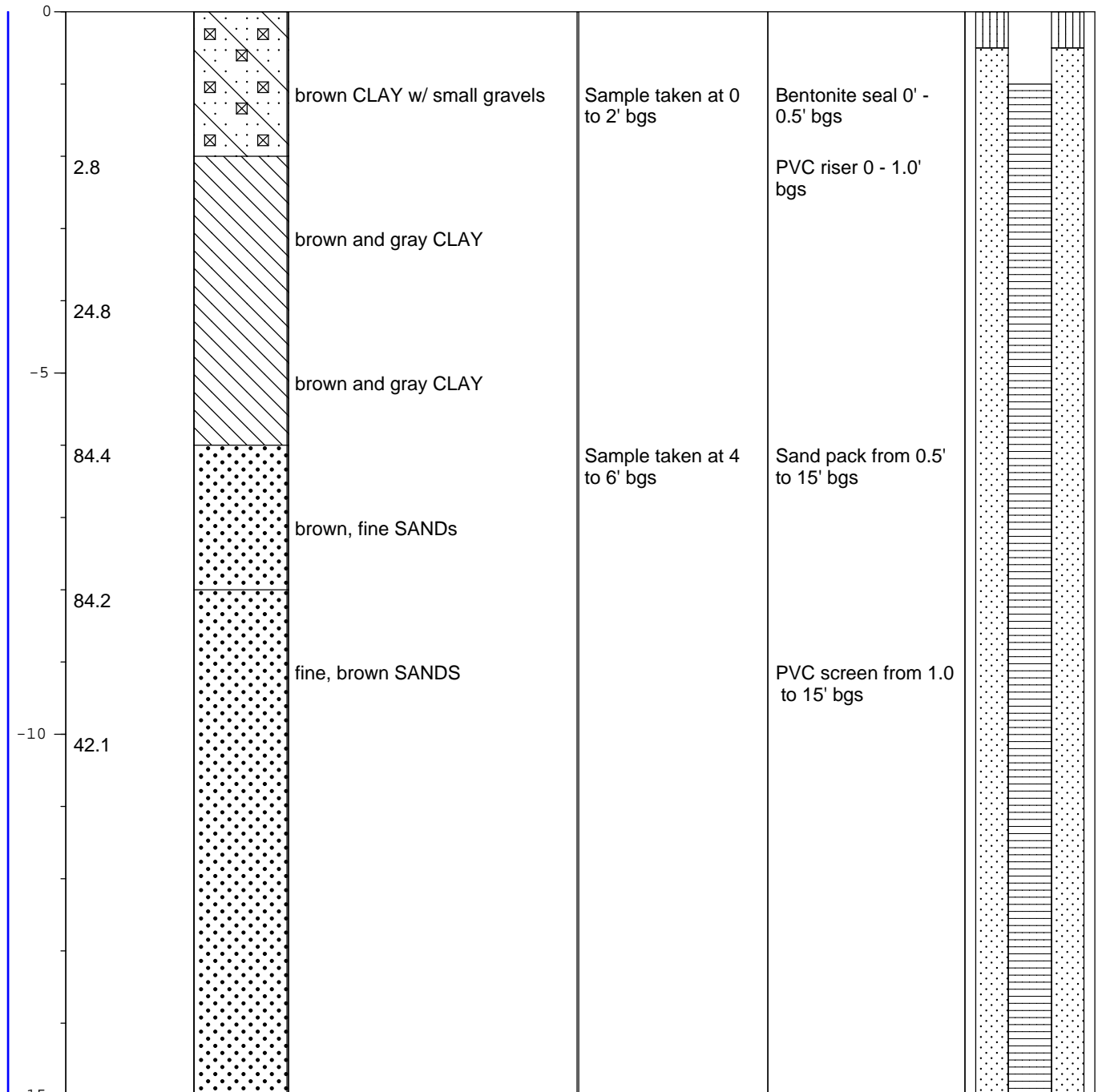
WELLBORE DIAMETER:

10"

TOTAL DEPTH: 15'

ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
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MONITORING WELL LOG: MW-459

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/21/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 15'

ELEVATION:

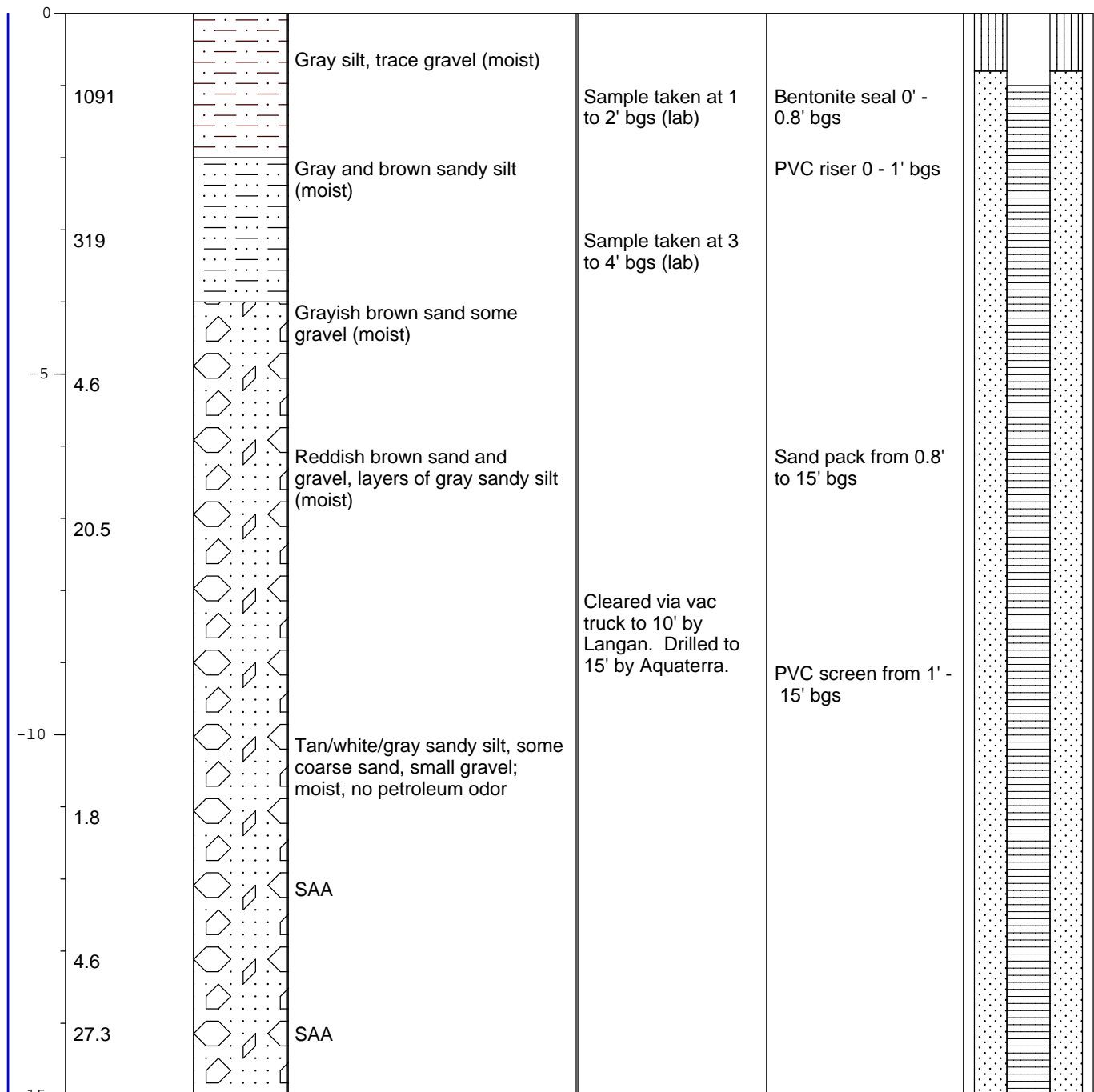
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
			Dark black - dark gray CLAY, oily sheen and strong odor	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.5'	
24.0			Dark brown - gray CLAY		PVC Riser 0 to 5' bgs	
29.6			Light brown, loose CLAY			
-5						
19.8			Dark gray, brown CLAY, moist		Sand Pack from 2.5' to 15' bgs	
36.8			Black, coarse sand; wet	Sample taken at 8 to 10' bgs	PVC Screen 5' to 15' bgs	
-10						
54.8						
-15						



MONITORING WELL LOG: MW-460

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental & TQD
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck & HSA
JOB NO.:		SAMPLING METHOD:	Hand auger & split spoon
LOGGED BY:	Eric Dieck/ LANGAN; Noelle Stroik/AT	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/7/13 & 6/28/13	WELLBORE DIAMETER:	14"
TOTAL DEPTH:	15	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
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MONITORING WELL LOG: MW-461

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Luke Mokrycki	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6-11-13	WELLBORE DIAMETER:	14"
TOTAL DEPTH:	18.5'	ELEVATION:	

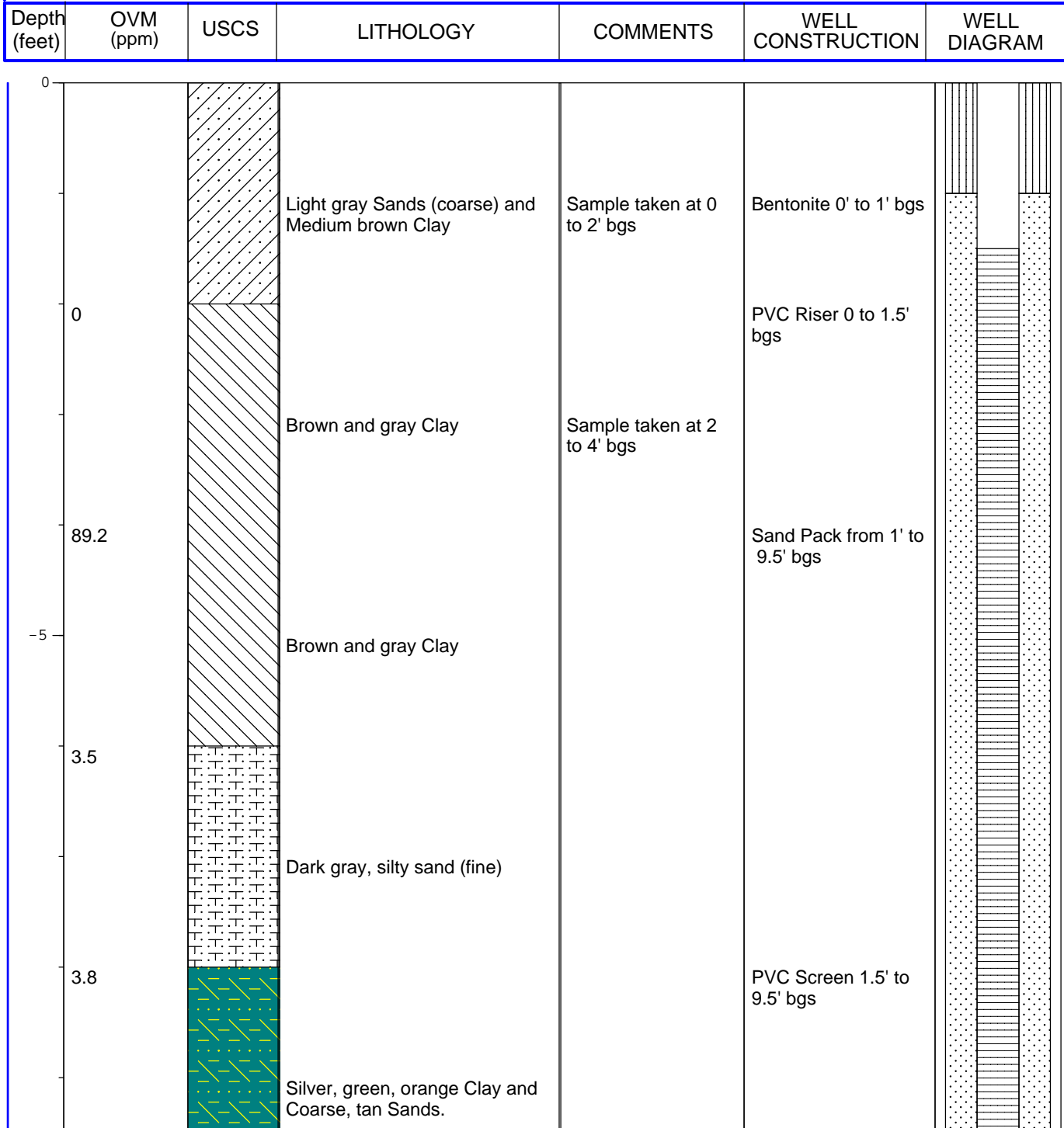
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
0.0			dark brown, silty CLAY and coarse sand	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs	
823.7			dark green - gray - black, silty SAND		PVC riser 0 - 2.5' bgs	
-5			fine black SAND			
195.3			dark gray CLAY; moist	Sample taken at 2 to 4' bgs	Sand pack from 2.0' to 18.5' bgs	
133.5			dark gray CLAY		PVC screen from 2.5' - 18.5' bgs	
-10						
125.6						
-15						

Project Marcus Hook Industrial Complex			Project No. 2574601		
Location AOI5			Elevation And Datum 20.611		
Drilling Agency Lewis Environmental			Date Started 6/11/13		Date Finished 6/11/13
Drilling Equipment Hydrovac Truck			Driller Paul Riale		
Size And Type of Bit 10 inch			Inspector Erick Dieck		
Method of Installation Hydrovac excavate to 15' bgs. Install 10 foot 4" diameter screen and 10 foot 4" diameter riser. Backfill annulus of well with filter sand to 3' bgs. Install bentonite hole plug seal to grade.					
Method of Well Development				Note 3 foot riser, 12 foot sand filter, 3 foot bentonite seal	
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand		
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite		
Borehole Diameter 18"			Type of Filter Material Filter Sand		
Top of Casing	Elevation 23.61'	Depth 3' ags			Well Details
Top of Seal	Elevation 20.61'	Depth 0' bgs			
Top of Filter	Elevation 17.61'	Depth 3' bgs			
Top of Screen	Elevation 15.61'	Depth 5' bgs			
Bottom of Filter	Elevation 5.61'	Depth 15' bgs			
Bottom of Well	Elevation	Depth 15' bgs			
Screen Length	10.0'	Slot Size 10 Slot			
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)					
Elevation 16.41'	DTW 7.2'	Date 8/12/2013			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
Elevation	DTW	Date			
			Soil / Rock Classification		Depth (ft)
			USCS Low Plasticity Clay		1
					2
					3
					4
					5
			USCS Silt		6
					7
					8
			Fill		9
					10
			Fill		11
					12
					13
					14



MONITORING WELL LOG: MW-464

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Luke Mokrycki	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/12/13- 6/13/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	9.5'	ELEVATION:	

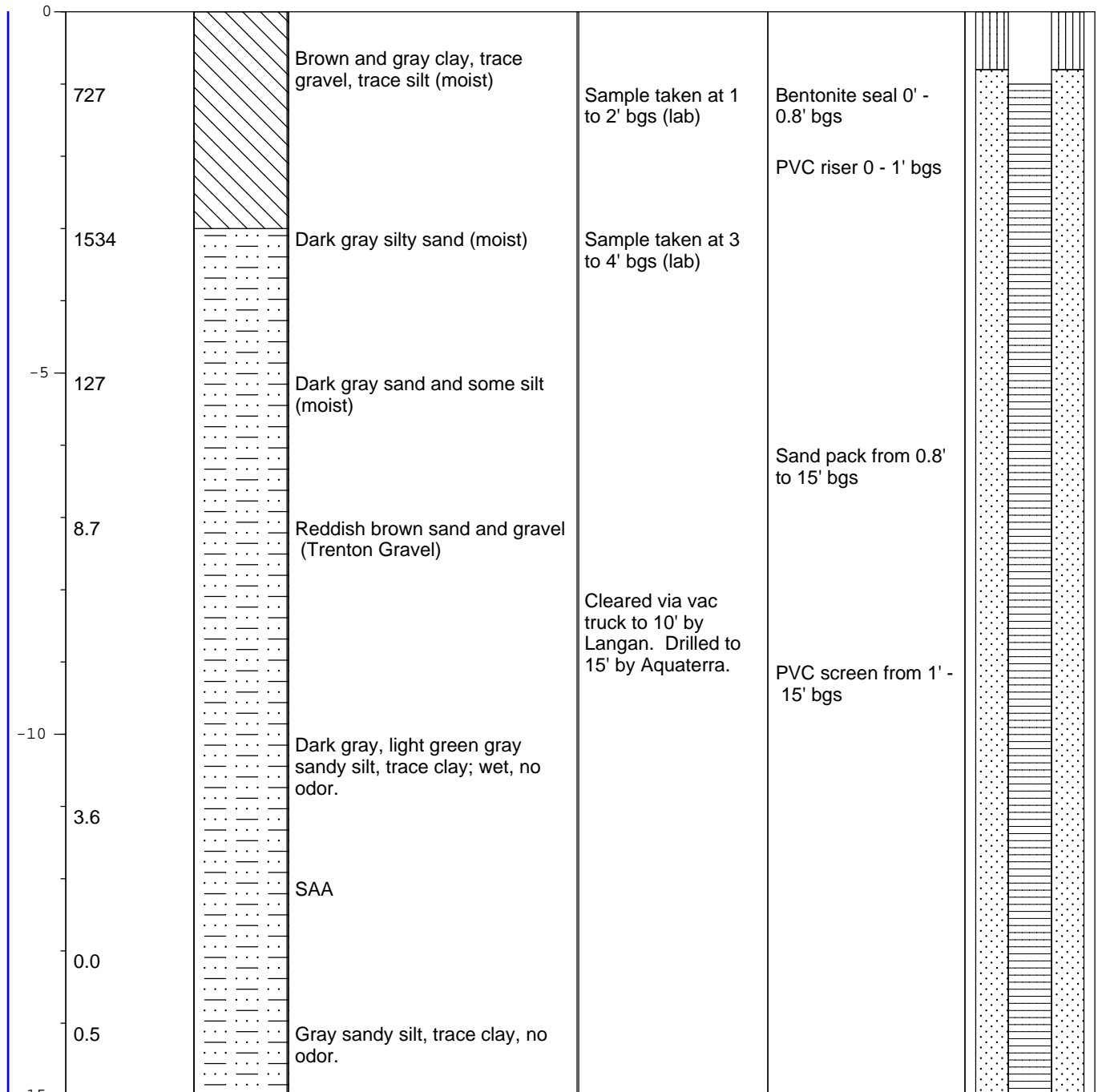




MONITORING WELL LOG: MW-465

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental & TQD
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck & HSA
JOB NO.:		SAMPLING METHOD:	Hand auger & split spoon
LOGGED BY:	Eric Dieck/ LANGAN; Noelle Stroik/AT	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/11/13 & 6/27/13	WELLBORE DIAMETER:	14"
TOTAL DEPTH:	15	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
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MONITORING WELL LOG: MW-467

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental & TQD
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck & HSA
JOB NO.:		SAMPLING METHOD:	Hand auger & split spoon
LOGGED BY:	Eric Dieck/ LANGAN; Noelle Stroik/AT	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/12/13 & 7/1/13	WELLBORE DIAMETER:	14"
TOTAL DEPTH:	19	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
0.3			Fill; brown silt, concrete, brick, rebar, gravel, cobbles, etc. (dry)	Sample taken at 0 to 1' bgs (lab)	Bentonite seal 0.5' - 4' bgs PVC riser 0 - 4.5' bgs	
1.0						
-5			Dark brown silty sand some gravel (dry)			
85.3			Dark brown silt trace clay, trace gravel (moist)		Sand pack from 4' to 19' bgs	
9.0						
183.2			Dark gray silty sand (wet)	Sample taken at 9 to 10' bgs (lab)	PVC screen from 4.5' - 19' bgs	
-10						
				Hole was collapsing to about 11' during clearing (to 16') by Langan; Aquaterra drilled to finish.		
-15						
33.1			Gray/white sandy silt, some coarse sand/gravel, moist, slight odor.			
20.3			Gray/white/tan silty sand, little coarse gravel, moist, slight odor.	Auger refusal at 19.5'		



MONITORING WELL LOG: MW-468

Page 1 of 1

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental
SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck
JOB NO.: SAMPLING METHOD: Hand auger
LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"
DATES DRILLED: 6/7/13 - 6/11/13 WELLBORE DIAMETER: 14"
TOTAL DEPTH: 12' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
			brown, silty CLAY w/ small gravels	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs	
6.0			light brown - gray CLAY		PVC riser 0 - 2.5' bgs	
0.9			orange - brown CLAY			
-5						
2.8				Sample taken at 8 to 10' bgs	Sand pack from 2.0' to 12' bgs	
			brown, clay and small gravels		PVC screen from 2.5' - 12' bgs	
-10	242.7					



MONITORING WELL LOG: MW-469

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 6/7/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 13'

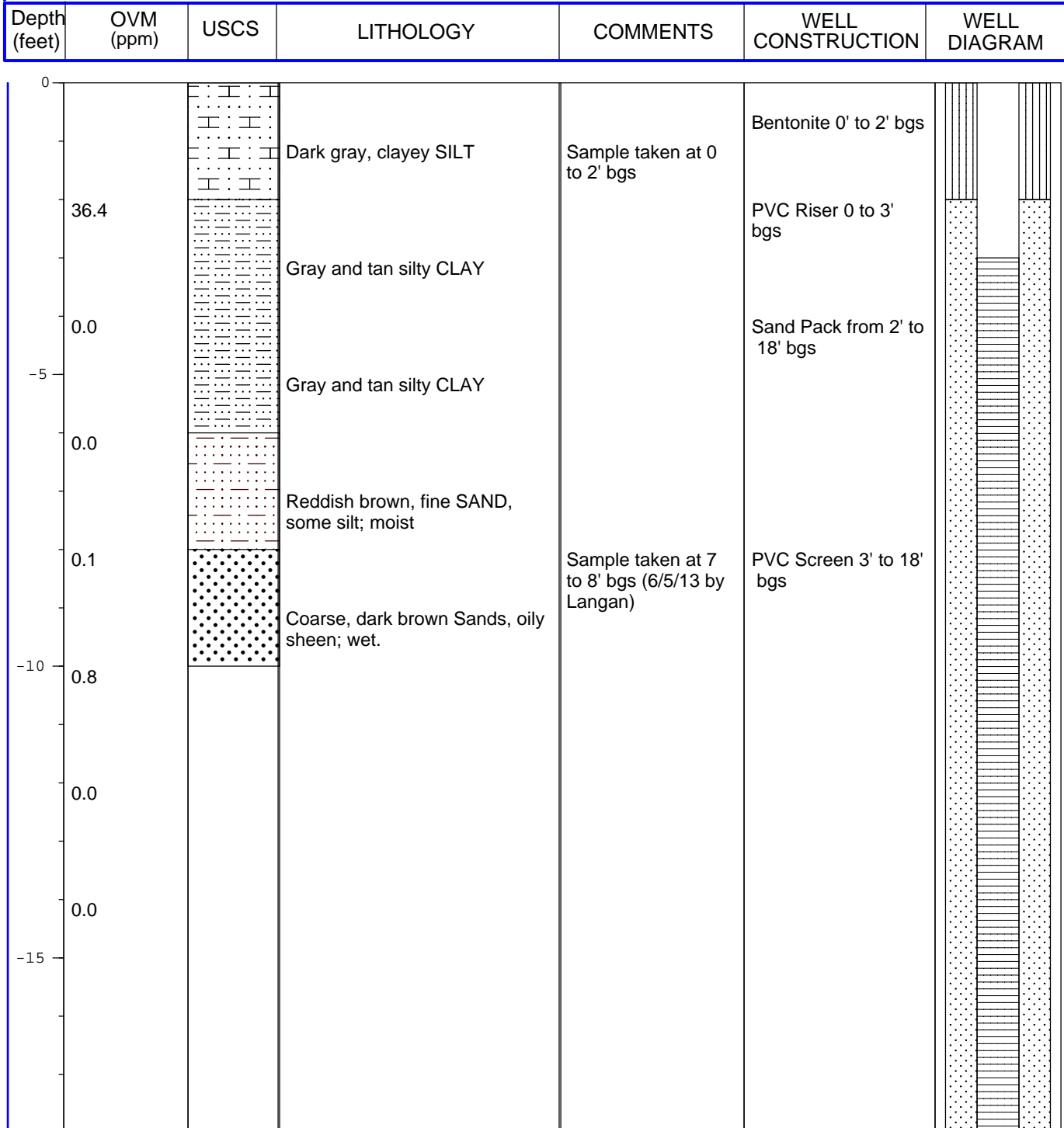
ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0			Brown sandy Clay w/ small gravels	Sample taken at 0 to 2' bgs	Bentonite 0' to 2' bgs	
0			Gray and brown Clay		PVC Riser 0 to 3' bgs	
111			Dark gray Clay	Sample taken at 4 to 6' bgs	Sand Pack from 2' to 13' bgs	
117			Light gray Clay			
35.4			Gray Clay and small gravels		PVC Screen 3' to 13' bgs	
47.1						



MONITORING WELL LOG: MW-471

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Eric Dreck (boring); Noelle Stroik (well)	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/4/13; 6/5/13; 7/1/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	18'	ELEVATION:	



Project Marcus Hook Industrial Complex			Project No. 2574601			
Location AOI5			Elevation And Datum 21.792			
Drilling Agency Lewis Environmental			Date Started 6/5/13		Date Finished 6/5/13	
Drilling Equipment Hydrovac Truck			Driller Paul Riale			
Size And Type of Bit 10 inch			Inspector Patrick Troy			
Method of Installation Hydrovac excavate to 13.5' bgs. Install 10 foot 4" diameter screen and 5 foot 4" diameter riser. Backfill annulus of well with filter sand to 2' bgs. Install bentonite hole plug seal to grade.						
Method of Well Development				Note total depth of 13 feet bgs, 8 foot screen, 8 foot riser, well sand up to 3 feet bgs, bentonite seal from 0.5 to 3 feet bgs		
Type of Casing PVC		Diameter 4"	Type of Backfill Material Filter Sand			
Type of Screen Slotted		Diameter 4"	Type of Seal Material Bentonite			
Borehole Diameter 18"			Type of Filter Material Filter Sand			
Top of Casing	Elevation 25.10'	Depth 3.31' ags		Well Details	Soil / Rock Classification	Depth (ft)
Top of Seal	Elevation 21.79'	Depth 0' bgs		GRAVEL trace silt (dry)	1	
Top of Filter	Elevation 18.79'	Depth 3' bgs		Dark brown SILT trace gravel (dry)	2	
Top of Screen	Elevation 16.79'	Depth 5' bgs		Brown, orange, grey CLAY (dry)	3	
Bottom of Filter	Elevation 8.79'	Depth 13' bgs			4	
Bottom of Well	Elevation	Depth 13' bgs			5	
Screen Length	8.0'	Slot Size 10 Slot		Dark gray silty CLAY (moist)	6	
GROUNDWATER ELEVATIONS (ft) (Measured from the Top of Casing)					7	
Elevation 15.49'	DTW 9.61'	Date 8/12/2013			8	
Elevation	DTW	Date			9	
Elevation	DTW	Date		Orange, brown coarse SAND and GRAVEL (Trenton Gravel?)	10	
Elevation	DTW	Date			11	
Elevation	DTW	Date		12		



MONITORING WELL LOG: MW-475

Page 1 of 1

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Luke Mokrycki	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/4/13	WELLBORE DIAMETER:	14"
TOTAL DEPTH:	17'	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
0.0			light brown to orange, clayey SILT w/ small gravels	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs	
295			gray and brown CLAY		PVC riser 0 - 2.5' bgs	
-5			grayish green and brown CLAY			
216			brown, sandy SILT	Sample taken at 2 to 4' bgs	Sand pack from 2.0' to 17' bgs	
88.5			dark gray, clayey SILT		PVC screen from 2.5' - 17' bgs	
-10						
88.9						
-15						



MONITORING WELL LOG: MW-476

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Eric Dreck; Noelle Stroik	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6/3/13 - 7/2/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	15'	ELEVATION:	

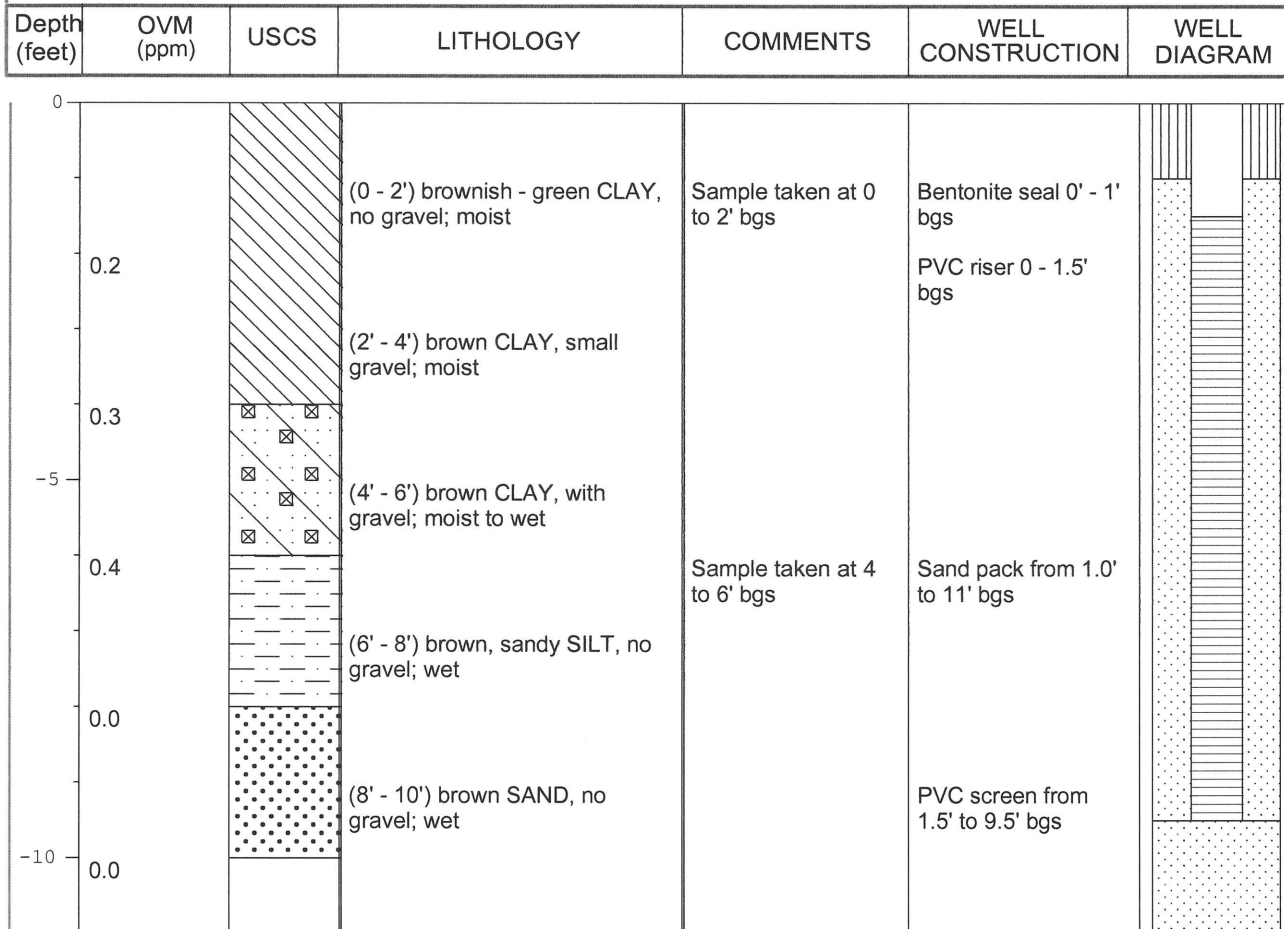
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
		NA		Sample taken at 0 to 2' bgs	Bentonite 0' to 0.8' bgs	
0.1			Brown silty CLAY, trace fine to coarse sand (moist)		PVC Riser 0 to 1' bgs	
0.1					Sand Pack from 0.8' to 15' bgs	
-5			Brown SILT, trace gravel (moist)			
1.2			Brown SAND, trace silt (moist)	Sample taken at 6 to 7' bgs		
PID not available			Brown SAND, trace silt (moist)		PVC Screen 1' to 15' bgs	
-10			Brown/gray, sandy SILT, little small gravel, and little clay (wet) *no petro-like odor			
0.8			Brown/gray, sandy SILT, little small gravel, and little clay (wet) *no petro-like odor			
0.1						
-15						



MONITORING WELL LOG: MW-478

Page 1 of 1

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Evan Ellewanger	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	5/31/13	WELLBORE DIAMETER:	10"
TOTAL DEPTH:	9.5'	ELEVATION:	





MONITORING WELL LOG: MW-479

Page 1 of 1

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental
SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck
JOB NO.: SAMPLING METHOD: Hand auger
LOGGED BY: Evan Ellewanger SCREEN/RISER DIAMETER: 4"
DATES DRILLED: 5/31/13 WELLBORE DIAMETER: 14"
TOTAL DEPTH: 12' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
			brownish green CLAY w/ gravel; dry	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2' bgs	
0.0			brownish gray CLAY w/ gravel; dry		PVC riser 0 - 4' bgs	
0.0			brown SAND w/ no gravel; wet			
-5			brownish gray SAND; wet	Sample taken at 6 to 8' bgs	Sand pack from 2.0' to 12' bgs	
0.0			brownish green SAND; wet		PVC screen from 4' to 12' bgs	
-10						



MONITORING WELL LOG: MW-480

PROJECT:	Sunoco- Marcus Hook Refinery	DRILLING CO.:	Lewis Environmental
SITE LOCATION:	AOI-5	DRILLING METHOD:	Hydrovac truck
JOB NO.:		SAMPLING METHOD:	Hand auger
LOGGED BY:	Luke Mokrycki	SCREEN/RISER DIAMETER:	4"
DATES DRILLED:	6-14-13	WELLBORE DIAMETER:	14"
TOTAL DEPTH:	15.5'	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
135.7			dark brown, sandy SILTS and gravels	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs	
1730			shiny, black CLAY	*strong odor	PVC riser 0 - 2.5' bgs	
-5			shiny, black and gray CLAY	*strong odor		
1008			dark tan and gray CLAY; moist	Sample taken at 2 to 4' bgs	Sand pack from 2.0' to 15.5' bgs	
56.8			dark gray and tan CLAY; wet		PVC screen from 2.5' - 15.5' bgs	
-10						
26.9						
-15						



MONITORING WELL LOG: MW-481

PROJECT: Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY: Eric Dreck; Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 6/13/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 13'

ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
		NA		Sample taken at 0 to 1' bgs	Bentonite 0' to 0.8' bgs	
3.3			Brown silty CLAY, trace fine to coarse sand (moist)		PVC Riser 0 to 1' bgs	
3.3					Sand Pack from 0.8' to 15' bgs	
-5			Brown SILT, trace gravel (moist)	Sample taken at 5 to 6' bgs		
2.6			Brown SAND, trace silt (moist)			
0.3			Brown SAND, trace silt (moist)		PVC Screen 1' to 15' bgs	
-10	0.5		Brown/gray, sandy SILT, little small gravel, and little clay (wet) *no petro-like odor			

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1

MW-482

DRILLING: STARTED **9/19/13** COMPLETED: **9/20/13**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **183030.286** *EASTING (ft): **2620854.418**
 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **12.3**
 INITIAL DTW (ft): **Not Measured** BOREHOLE DEPTH (ft): **17.5**
 STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **16**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **J. Richter** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1		GP	dark gray, poorly graded GRAVEL, gravel-sand mixture, little to no fines, odor		MW-482 (0-2.0)			21		Bentonite chips
2		SC	dark gray CLAYEY SAND, sand-clay mixture, LNAPL observed, strong odor		MW-482 (2.0-4.0)			618		
3										
4										
5					MW-482 (4.0-5.5)			421	5	
6		SM	dark gray SILTY SAND, strong odor		-			146		#1 Sand
7					-					
8		ML	light brown SILT, mixed with green-black material, odor		-			21		
9		CL	green gray CLAY, mixed with green-black material, odor		-			5	10	4" 0.020 PVC
10					-					
11		OL	green gray CLAY, organics, odor		-			6		
12					-					
13					-					
14					-			1		
15					-				15	
16					-					
17					-			1		
18			End of boring at 17.5 ft bgs							
19			Note: Transition depth between bentonite chips and sand in well construction is assumed.							

BORING LOGS

LOCATION: Sunoco Marcus Hook Refinery, Post Road
DATE: 14 and 15 January, 2000
GEOLOGIST: James Mulry, P.G.
DRILLER: B. L. Myers Bros., Inc., Glenmoore, PA
METHOD: Earthprobe®, 2" Core barrel
CONSTRUCTION: 5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5" Sch 40 PVC Pipe;

BORING B-53, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-1'	Asphalt and ballast	
1'-3'	Slightly very fine sandy brown clay	Gradational change to lower unit
3'-5'	Slightly very fine sandy gray clay	Increasing sand and coarsening downward, grading into lower unit
5'-8'	Fine to medium gray sand	

MW-B53

BORING B-54, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-1'	Asphalt and ballast	
1'-6'	Slightly very fine sandy brown clay	Gradational change to lower unit
6'-8'	Slightly very fine sandy gray clay	Increasing sand and coarsening downward, grading into lower unit
8'	Fine to very fine gray sand	

BORING B-55, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-1'	Gravel over geo-fabric	
1'-3'	Slightly fine sandy clay	Some gravel, fill?
3'-6'	No Return	No return due to void?
6'-8'	Dark gray/black clay	

 AOI-5
 MW-01255

PROJECT: **Marcus Hook Refinery**
 LOCATION: **AOI-5**
 PROJECT NUMBER:

WELL / PROBEHOLE / BOREHOLE NO:

MW-510 PAGE 1 OF 1



DRILLING / INSTALLATION:

STARTED **3/18/15** COMPLETED: **3/24/15**

DRILLING COMPANY: **Total Quality Drilling**

DRILLING EQUIPMENT: **HSA**

DRILLING METHOD: **Auger Rig**

SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):

LAT:

GROUND ELEV (ft):

INITIAL DTW (ft): **Not Encountered**

STATIC DTW (ft): **3.51**

WELL CASING DIA. (in): **4**

LOGGED BY: **NS**

EASTING (ft):

LONG:

TOC ELEV (ft):

WELL DEPTH (ft): **6.0**

BOREHOLE DEPTH (ft): **6.0**

BOREHOLE DIA. (in): **12**

CHECKED BY: **TD**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
			GRAVEL SOME SILT LITTLE FINE TO MEDIUM SAND ; brown; medium to coarse-grained; wet; subangular; Utility clearing completed via backhoe to a depth of 7 feet bgs.		0800 MW-510_0-2			67		0-0.5' Bentonite
			GRAVEL SOME SILT TRACE CLAY ; brown; medium to coarse-grained; wet; subangular		MW-510@ 2-4'			10.2		0.5-6': Sand 1-6': PVC Screen
5			SAND LITTLE CLAY AND FINE TO MEDIUM GRAVEL ; grayish black; fine to medium sand-grained; wet; subangular; Bedrock at approximately 7' bgs.		0815 MW-510_4-6			212	5	
			Borehole terminated at 6 feet.							

PROJECT: **Marcus Hook Industrial Complex**LOCATION: **AOI-5**PROJECT NUMBER: **213402567.200**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 2

MW-554DRILLING: STARTED **8/31/15** COMPLETED: **9/2/15**

INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: **HT Sweeney/Parratt Wolff**DRILLING EQUIPMENT: **Track Mounted IR A-300/Backhoe**DRILLING METHOD: **Direct Push Macrocore, Split Spoon/HSA**SAMPLING EQUIPMENT: **Backhoe/Direct Push Macrocore/SS***NORTHING (ft): **181622.85***EASTING (ft): **2622344.89***GROUND ELEV (ft): **17.8***TOC ELEV (ft): **19.9**INITIAL DTW (ft): **8**BOREHOLE DEPTH (ft): **22**STATIC DTW (ft): **8.5**

WELL DEPTH (ft):

WELL CASING DIAMETER (in): **4**BOREHOLE DIAMETER (in): **10**LOGGED BY: **DH/AK**CHECKED BY: **J. DeBoer**

*COORDINATE SYSTEM AND DATUMS: NJ STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1		FILL	FILL; brown, fine to medium, silty sand with some gravel, dry		MW-554 (0-2') 20150831			0.0		Bentonite chips
2					--					4" PVC Riser
3		FILL	FILL; Brown, silty CLAY with little fine to medium sand, dry		--			2		
4					--			9		
5					--			5	5	
6										
7					MW-554 (6-8') 20150831			25		#1 Sand
8			Location cleared to 8' via backhoe. Switched to hollow stem auger with direct push split spoon.		--			9		
9		FILL	FILL; Brown/black, CLAY/SILT, trace fine sand, slight micaceous quartzite gravel in tip, moist to wet		--			0.0		
10			Probe refusal at 10'. Switch to direct push split spoons.		--	0.2				
11		FILL	FILL; Same as above, concrete/rock					3	10	4" 0.020 PVC
12		FILL	FILL; Dark grayish brown, gray/black, CLAY/SILT, wet, saturated by 12' +/-			0.8				
13					--			0.0		
14			Refusal at 13.5' on old stone wall. Offset ~4-5' south and continued spooning at 14' below ground surface		--			5		
15		CL	CL; Dark gray CLAY, possible fill, little fine to coarse gravel, trace rootlets or other fibers, wet		--	0.8		55	15	
16		CL	CL; Same as above		--			0.0		
17		SP	SP; Orange-brown to brown, fine to medium SAND, well sorted, some black grains, wet			1.3				
18		VOID	VOID; No Recovery							
19						0				

PROJECT: Marcus Hook Industrial Complex LOCATION: AOI-5 PROJECT NUMBER: 213402567.200		WELL / PROBEHOLE / BOREHOLE NO: PAGE 2 OF 2 MW-554		
DRILLING: STARTED 8/31/15 COMPLETED: 9/2/15 INSTALLATION: STARTED COMPLETED: DRILLING COMPANY: HT Sweeney/Parratt Wolff DRILLING EQUIPMENT: Track Mounted IR A-300/Backhoe DRILLING METHOD: Direct Push Macrocore, Split Spoon/HSA SAMPLING EQUIPMENT: Backhoe/Direct Push Macrocore/SS		*NORTHING (ft): 181622.85 *EASTING (ft): 2622344.89 *GROUND ELEV (ft): 17.8 *TOC ELEV (ft): 19.9 INITIAL DTW (ft): 8 BOREHOLE DEPTH (ft): 22 STATIC DTW (ft): 8.5 WELL DEPTH (ft): WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 LOGGED BY: DH/AK CHECKED BY: J. DeBoer		
*COORDINATE SYSTEM AND DATUMS: NJ STATE PLANE SOUTH, NAD83; NAVD 88				

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
21		SP	SP; Dark brown, fine SAND, trace medium sand, wet	X	--	1		0.0		
		CL	CL; Dark brown CLAY, trace to little fine sand, trace coarse sand							
22			End of boring at 22'							
23										
24										
25									25	
26										
27										
28										
29										
30									30	
31										
32										
33										
34										
35									35	
36										
37										
38										
39										

PROJECT: **Marcus Hook Industrial Complex**LOCATION: **AOI-5**PROJECT NUMBER: **213402567.200**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1

MW-555DRILLING: STARTED **8/31/15** COMPLETED: **8/31/15**

INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: **HT Sweeney/Parratt Wolff**DRILLING EQUIPMENT: **Track Mounted IR A-300/Backhoe**DRILLING METHOD: **Direct Push Macrocore, Split Spoon/HSA**SAMPLING EQUIPMENT: **Backhoe/Direct Push Macrocore/SS***NORTHING (ft): **183480.23***EASTING (ft): **2622318.09***GROUND ELEV (ft): **11.3***TOC ELEV (ft): **10.94**INITIAL DTW (ft): **8**BOREHOLE DEPTH (ft): **11.5**STATIC DTW (ft): **2**

WELL DEPTH (ft):

WELL CASING DIAMETER (in): **4**BOREHOLE DIAMETER (in): **10**LOGGED BY: **DH/JD**CHECKED BY: **A. Klingbeil**

*COORDINATE SYSTEM AND DATUMS: NJ STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
			ASPHALT							
1		SM	SM; Dark brown, fine to medium, silty SAND, some gravel, dry		-- MW-555 (0.5-2') 20150831			0.0		Bentonite chips
2		SM	SM; Same as above, SAND, trace to no gravel, dry		--			29		4" PVC Riser
3		CL	CL; Dark brown, silty CLAY, little fine sand, dry to moist							#1 Sand
4					--			37		
5					--			31	5	4" 0.020 PVC
6										
7			Moist at 7.0' Location cleared to 8' via backhoe. Switched to hollow stem auger with direct push split spoon.		MW-555 (6-8') 20150831					
8		SW-SM	SW-SM; Grayish-brown, fine SAND, some gravel, little silt, trace clay. Gravel is well rounded, poorly sorted, wet		--			50		
9			Reddish brown cobble at 9.5' Same as 8-9' but yellowish-brown		--			7		
10					--	3.5		0.0	10	
11		BR	BR; Weathered BEDROCK, whitish-gray, rock fragments		--			0.0		
12		BR	BR; BEDROCK, orange black and white SAND, some clay, micaceous, moist Refusal at 11.5'							
13										
14										
15									15	
16										
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1

MW-573

DRILLING: STARTED **6/24/16** COMPLETED: **6/27/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **BackHoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **182743.6** *EASTING (ft): **2622205.36**
 *GROUND ELEV (ft): **5.66** *TOC ELEV (ft): **8.32**
 INITIAL DTW (ft): **3** BOREHOLE DEPTH (ft): **12**
 STATIC DTW (ft): **3** WELL DEPTH (ft): **12**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace P.D (ppm)	Depth (feet)	Well Construction
1			FILL; brown to dark brown SILT, staining, rebar and stone, dry		--			0		
2			Moist		AOI5-MW-573 -1-2			0.8		Bentonite chips
3		SP-GP	dark brown coarse SAND and fine GRAVEL, trace silt, staining, saturated		AOI5-MW-573 -3-4			2.8		4" PVC Riser
4		SW-GP	medium to coarse SAND and fine GRAVEL, black staining, saturated		--			8.5		#1 Sand
5		SW	medium to fine SAND, some fine gravel, staining, saturated		--			0.9		
6		ML	SILT, red to olive grey, little fine sand, black stained wood, wet		--			1		4" 0.020 PVC
7					--			0.4		
8		ML-CL	Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling		--			0		
9			grey SILT and CLAY, staining, trace wood fibers in shoe, wet		--	1.9	1 1 1 2	0		
10		CL	dark grey to dark brown CLAY, wood fibers (possibly stained), trace silt (towards bottom), saturated		--	2	1 1 2 2	0		
11										
12			End of boring at 12 ft bgs							
13										
14										
15										
16										
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1

MW-574

DRILLING: STARTED **6/15/16** COMPLETED: **6/20/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **184209.5** *EASTING (ft): **2622872.16**
 *GROUND ELEV (ft): **12.46** *TOC ELEV (ft): **15.03**
 INITIAL DTW (ft): **2** BOREHOLE DEPTH (ft): **14**
 STATIC DTW (ft): **1** WELL DEPTH (ft): **14**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1		ML	dark brown SILT, some fine sand, moist		AOI5-MW-574 -1-2			127.6	127.6	<div>Bentonite chips</div> <div>4" PVC Riser</div> <div>#1 Sand</div> <div>4" 0.020 PVC</div>
2		SP	dark brown fine SAND, some silt, wet		--		72.9	72.9		
3					--		165.3			
4		SP	dark brown to grey fine SAND, little silt, wet		--		109.1			
5					AOI5-MW-574 -5.0-5.5			194.5	5	
6		SP	brown to grey SAND, wet		--		0			
7					--		0			
8		CL	Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling light grey CLAY, little silt, yellow sandy striations at 9 ft, moist			--	1.3	32.7		
9									10	
10		CL	dark yellow to light brown CLAY, little silt, moist			--	1.5	0		
11			light to dark grey, some saprolite, trace silt			--				
12		ML	grey to green SILT, little clay, dry			--	1	0		
13										
14			End of boring at 14 ft bgs							
15									15	
16										
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



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MW-575

DRILLING: STARTED **6/17/16** COMPLETED: **6/27/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **183002.16** *EASTING (ft): **2621657.34**
 *GROUND ELEV (ft): **11.16** *TOC ELEV (ft): **13.69**
 INITIAL DTW (ft): **10** BOREHOLE DEPTH (ft): **16**
 STATIC DTW (ft): **5** WELL DEPTH (ft): **15**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1		GC	brown, sandy gravelly CLAY, pebbles and cobbles, dry		AOI5-MW-575 -0-2			1		
2			slight odor starting at 2 ft		--			19		
3					--			2		
4				increasing clay content below 4 ft, stiff		--		295		
5		CL	brown CLAY, some pebbles, black staining, odor, dry		--			5		
6					--			595		
7					--			212		
8				Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling No Recovery		AOI5-MW-575 -6.5-7.5				
9					--	0	5 4 5 5			
10		CL- ML	brown to grey SILT and CLAY, wet						10	
11		SW	brown, medium to fine SAND, broken rocks, saturated		--	1.7	5 9 16 20	7.5		
12		SP	brown fine SAND, little silt and clay, saturated							
13		SW	brown to dark brown, medium to fine SAND, saturated		--	0.4	5 9 14 7	0		
14		SW	brown to red, medium to fine SAND, trace silt and clay, saturated							
15					--	0.3	3 3 4 3	0	15	
16			End of boring at 16 ft bgs							
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



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MW-576

DRILLING: STARTED **6/16/16** COMPLETED: **6/27/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **182570.44** *EASTING (ft): **2621565.1**
 *GROUND ELEV (ft): **6.99** *TOC ELEV (ft): **9.62**
 INITIAL DTW (ft): **4** BOREHOLE DEPTH (ft): **14**
 STATIC DTW (ft): **2.5** WELL DEPTH (ft): **13**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1		ML	brown SILT, some fine sand, little gravel, dry		AOI5-MW-576 -0-2			0		Bentonite chips
2		ML	brown to grey SILT, little fine sand, moist		--			0		4" PVC Riser
3		ML	brown to grey SILT, moist		--			0		
4		ML	grey SILT, little clay, some black staining, wet		AOI5-MW-576 -4-5			4.7		
5		CL	grey CLAY, some silt, black staining, wet		--			2.1		#1 Sand
6					--			1.1		
7		CL	grey to dark grey to grey CLAY, black staining, little silt and organic material, wet		--			0.1		4" 0.020 PVC
8			Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling		--					
9					--	1.2	2 2 2	0		
10					--					
11					--	1.7	1 2 2 2	0		
12		CL	grey CLAY, wet, stiff at bottom 0.1 ft		--					
13					--	0.5	1 1 2 4	0		
14			End of boring at 14 ft bgs							
15										
16										
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



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MW-577

DRILLING: STARTED **6/16/16** COMPLETED: **6/22/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **BackHoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **181932.78** *EASTING (ft): **2621553.37**
 *GROUND ELEV (ft): **12.13** *TOC ELEV (ft): **14.65**
 INITIAL DTW (ft): **6** BOREHOLE DEPTH (ft): **16**
 STATIC DTW (ft): **7** WELL DEPTH (ft): **15**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1			FILL; brick and asphalt		--					
2		ML	grey to dark brown SILT, moist		AOI5-MW-577 -1-2			7.9		Bentonite chips
3		ML	light brown to grey SILT, some yellow fine sand, moist		--			2.5		
4					--			2.7		
5		SW	yellow medium to fine SAND, some light brown silt, slight staining, moist		--			3.8		4" PVC Riser
6		SW-SM	yellow medium to fine SAND and brown SILT, some staining, moist		AOI5-MW-577 -5-6			17.6		
7		ML	brown SILT, some medium yellow sand, wet		--			3.6		
8		ML	brown SILT, wet		--			0		#1 Sand
9		ML	Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling dark brown SILT, some staining, moist		--					
10					--	1.1	6 8 8 9	5		4" 0.020 PVC
11			some fine brown sand from 10-12 ft		--	1.0	4 5 6 8	15		
12					--					
13			becomes wet from 12-16 ft		--	0.1	14 10 12 12	0		
14					--					
15					--	0.3	10 8 5 5	0		
16			End of boring at 16 ft bgs							
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



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MW-578

DRILLING: STARTED **6/17/16** COMPLETED: **6/23/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **182536.97** *EASTING (ft): **2620162.44**
 *GROUND ELEV (ft): **13.15** *TOC ELEV (ft): **15.74**
 INITIAL DTW (ft): **8** BOREHOLE DEPTH (ft): **13.5**
 STATIC DTW (ft): **5.5** WELL DEPTH (ft): **13**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1			FILL; brown gravelly SAND, pockets of clay, some pebbles and cobbles, brick and wood fragments, no odor, dry		AOI5-MW-578-0-2				0	Bentonite chips
2		SW-GW	brown-grey gravelly SAND, pockets of grey clay, pebbles, dry		--				0	4" PVC Riser
3					--				0	
4		SW-GW	brown-grey gravelly SAND, pockets of gravel, black staining, moist		AOI5-MW-578-4-5				2	
5					--				5	#1 Sand
6					--				0	
7					--				0	4" 0.020 PVC
8		CL-ML	Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling CLAY and SILT, jade green, white striations and black speckles, wet		--				0	
9					--	1	2 3 5 4		0	
10			No Recovery		--				10	
11					--	0	3 3 5 7		0	
12		CL	dark green CLAY, little silt, wet		--	0.5	2 5 50/3		0	
13			WEATHERED BEDROCK; green and white, wet		--					
14			Refusal at 13.5 ft bgs							
15									15	
16										
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



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MW-579

DRILLING: STARTED **6/17/16** COMPLETED: **6/24/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **182706.72** *EASTING (ft): **2620430.73**
 *GROUND ELEV (ft): **13.71** *TOC ELEV (ft): **16.56**
 INITIAL DTW (ft): **8** BOREHOLE DEPTH (ft): **16**
 STATIC DTW (ft): **5** WELL DEPTH (ft): **15**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1		SW-GW	brown-grey gravelly SAND, some black stains, large cobbles and pebbles, odor, dry		AOI5-MW-579-0-2			172		
2					--			191		
3					--			278		
4					--			495		
5					AOI5-MW-579-5-6			98		
6					--			41		
7					--			90		
8		SP-SM	Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling brown to dark brown, fine SAND and SILT, little to some medium to coarse gravel, wet		--	0.6	1 3 7 8	47		
9					--			19		
10					--			39		
11					--			3		
12		SP	dark brown fine SAND, some silt, wet		--	0.3	3 5 8 10	2		
13					--			15		
14					--					
15		CL-ML	brown CLAY and SILT, wet		--	1.3	3 5 11 13			
16					--					
17			WEATHERED BEDROCK; green and white, wet							
18			End of boring at 16 ft bgs							
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



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MW-580

DRILLING: STARTED **6/16/16** COMPLETED: **6/24/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **BackHoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **183048.15** *EASTING (ft): **2620438.85**
 *GROUND ELEV (ft): **18.21** *TOC ELEV (ft): **20.7**
 INITIAL DTW (ft): **7** BOREHOLE DEPTH (ft): **18**
 STATIC DTW (ft): **5.5** WELL DEPTH (ft): **16**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction	
1		ML	grey SILT, little to some yellow fine sand, dry to moist		AOI5-MW-580 -1-2			91.9			
2					--			24			
3					--			25.7			
4					--			84.5			
5					--			119.2			
6					--			82.1			
7						AOI5-MW-580 -7-8			155.6		
8		SP	Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling								
9			dark grey fine SAND, some medium gravel, little silt, wet		--	0.6	2 12 9 5	26.9			
10		SP- SC	light grey fine SAND and CLAY, wet						10		
11		SW	yellow to grey, medium to fine SAND, some clay, wet		--	0.9	4 4 5 5	6.9			
12		SP	yellow medium SAND, some grey clay, wet								
13					--	0.9	3 4 5 5	0.5			
14		CL	grey CLAY, some medium yellow sand, little white clay and trace grey/ white weathered rock in bottom 0.2', wet								
15					--	1.5	3 7 6 6	0.3	15		
16		CL	grey/white CLAY and WEATHERED BEDROCK, wet								
17					--	1.1	6 7 8 7	0			
18			End of boring at 18 ft bgs								
19											

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



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MW-581

DRILLING: STARTED **6/17/16** COMPLETED: **6/23/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **182004.86** *EASTING (ft): **2620861.33**
 *GROUND ELEV (ft): **8.58** *TOC ELEV (ft): **11.21**
 INITIAL DTW (ft): **6** BOREHOLE DEPTH (ft): **14**
 STATIC DTW (ft): **6.5** WELL DEPTH (ft): **13**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1			FILL; gravel with coarse sand, pockets of gray clay, pebbles/ cobbles, pieces of wood and liner, odor, black staining and product, slightly moist		AOI5-MW-581-0-2			58		Bentonite chips
2			FILL; sandy gravelly clay, brown-black, firm, brick fragments, black staining, bands of residual product, odor, dry		--			371		4" PVC Riser
3		CL	brown-grey CLAY, firm, some pebbles/ cobbles, black staining, bands of residual product, odor, dry		--			166		
4		SPG	red-purple, gravelly coarse SAND, dry		--			194		
5			pockets of clay and black staining at 5 ft		AOI5-MW-581-5-6			426	5	#1 Sand
6			moist to wet at 6 ft		--			407		
7					--			401		4" 0.020 PVC
8			Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling		--					
9		SP-GP	red-purple, coarse SAND and medium GRAVEL, staining, some clay at 10 ft, wet		--	0.3	2 2 3 2	88		
10					--				10	
11					--	0.4	2 2 4 6	26		
12		CL	dark grey CLAY, some medium gravel, staining, some organic material (wood fibers), wet		--	0.3	2 3 5 5	73		
13										
14			End of boring at 14 ft bgs							
15									15	
16										
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1

MW-582

DRILLING: STARTED **6/16/16** COMPLETED: **6/23/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **181709.53** *EASTING (ft): **2621248.54**
 *GROUND ELEV (ft): **11.05** *TOC ELEV (ft): **13.88**
 INITIAL DTW (ft): **4** BOREHOLE DEPTH (ft): **14**
 STATIC DTW (ft): **3** WELL DEPTH (ft): **14**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1		ML	brown to grey to black SILT, staining, purple staining from 1-2 ft, moist at 4 ft: brick and pottery fragments, wet little brown fine sand from 6 to 7 ft trace fine gravel from 7 to 12 ft Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling		AOI5-MW-582 -1-2			43.6		
2					--		26			
3					--		22			
4					AOI5-MW-582 -4-5		31.3			
5					--		18.2			
6					--		27.2			
7					--		3			
8					--		9 6 6 8			
9					--		0			
10					--		5 3 3 3			
11					--		4			
12						CL- ML	dark brown SILT and dark grey CLAY, clay content increases with depth, some organic material (wood fibers) at 13 ft		--	
13										
14										
15			End of boring at 14 ft bgs							
16										
17										
18										
19										

PROJECT: **Marcus Hook Industrial Complex**
 LOCATION: **AOI 5**
 PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:



PAGE 1 OF 1

MW-583

DRILLING: STARTED **6/15/16** COMPLETED: **6/20/16**
 INSTALLATION: STARTED COMPLETED:
 DRILLING COMPANY: **HT Sweeney / Total Quality Drilling**
 DRILLING EQUIPMENT: **Backhoe/Holemaster**
 DRILLING METHOD: **Backhoe/Split Spoon/HSA**
 SAMPLING EQUIPMENT: **Backhoe/ Split Spoon**

*NORTHING (ft): **182972.58** *EASTING (ft): **2622778.53**
 *GROUND ELEV (ft): **6.25** *TOC ELEV (ft): **8.93**
 INITIAL DTW (ft): **1** BOREHOLE DEPTH (ft): **14**
 STATIC DTW (ft): **3** WELL DEPTH (ft): **12.5**
 WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **10**
 LOGGED BY: **D. Downing** CHECKED BY: **A. Patel**

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Depth (feet)	Graphic Log	USCS	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	Well Construction
1		SP	light brown fine SAND, black staining from 1 to 2 ft, wet		AOI5-MW-583 -1-2			8.7		Bentonite chips
2		SW	medium to fine brown SAND, black staining, wet		AOI5-MW-583 -2-3			81.8		4" PVC Riser
3					--			17.9		
4					--			62.9		
5					--			29.4	5	#1 Sand
6		SW-GW	medium to fine SAND and medium to fine GRAVEL, black staining, wet		--			58.9		
7		GW	medium to fine GRAVEL, black staining, wet		--			129		4" 0.020 PVC
8		ML	Location cleared to 8 ft via backhoe; switched to hollow stem auger with split spoon sampling		--					
9			SILT, black staining, little gravel from 8 to 10 ft, wet		--	0.3	3 2 2 2	1.7		
10			little to some clay from 10 to 14 ft; some organic material at 10 ft		--		1 2 2 2	1.1	10	
11					--	2.6				
12					--		1 1 2 3			
13					--	0.3				
14			End of boring at 14 ft bgs							
15									15	
16										
17										
18										
19										

PROJECT: **Marcus Hook Refinery, DE Seep**LOCATION: **Sunoco**PROJECT NUMBER: **62SU.01099.05**

WELL / PROBEHOLE / BOREHOLE NO:

OW-13 PAGE 1 OF 1DRILLING: STARTED **8/10/05** COMPLETED: **8/10/05**INSTALLATION: STARTED **8/10/05** COMPLETED: **8/10/05**DRILLING COMPANY: **Parratt-Wolff**

DRILLING EQUIPMENT:

DRILLING METHOD: **hollow stem auger**

SAMPLING EQUIPMENT:

NORTHING (ft):

LATITUDE:

GROUND ELEV (ft):

INITIAL DTW (ft): **N/A**STATIC DTW (ft): **N/A**WELL CASING DIAMETER (in): **4**LOGGED BY: **S. Morescalchi**

EASTING (ft):

LONGITUDE:

TOC ELEV (ft):

BOREHOLE DEPTH (ft): **25.0**WELL DEPTH (ft): **25.0**BOREHOLE DIAMETER (in): **8**

CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction stick-up 3 feet
5		SM	SILT AND FINE SAND LITTLE MEDIUM TO COARSE SAND ; SM; brown; dry						5	
10		CL	CLAY LITTLE SILT LITTLE FINE TO COARSE SAND ; CL; black; moist; hard drilling at approximately 15 feet						10	
15			No recovery						15	
20									20	

Hole terminated at 25 feet.

PROJECT: **Marcus Hook Refinery, DE Seep**LOCATION: **Sunoco**PROJECT NUMBER: **62SU.01099.05**

WELL / PROBEHOLE / BOREHOLE NO:

OW-14 PAGE 1 OF 1DRILLING: STARTED **8/11/05** COMPLETED: **8/11/05**INSTALLATION: STARTED **8/11/05** COMPLETED: **8/11/05**DRILLING COMPANY: **Parratt-Wolff**

DRILLING EQUIPMENT:

DRILLING METHOD: **hollow stem auger/ air rotary**

SAMPLING EQUIPMENT:

NORTHING (ft):

LATITUDE:

GROUND ELEV (ft):

INITIAL DTW (ft): **N/A**STATIC DTW (ft): **N/A**WELL CASING DIAMETER (in): **4**LOGGED BY: **S. Morescalchi**

EASTING (ft):

LONGITUDE:

TOC ELEV (ft):

BOREHOLE DEPTH (ft): **25.0**WELL DEPTH (ft): **25.0**BOREHOLE DIAMETER (in): **8**

CHECKED BY:

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
		SM	SILT AND FINE SAND LITTLE MEDIUM TO COARSE SAND ; SM; brown; dry							
		CL	CLAY LITTLE SILT LITTLE FINE TO COARSE SAND ; CL; black; moist; hard drilling at 7 feet							
5										
10			No recovery							
15										
20										

Hole terminated at 25 feet.

PROJECT: **Marcus Hook Refinery, DE Seep**LOCATION: **Sunoco**PROJECT NUMBER: **62SU.01099.05**

WELL / PROBEHOLE / BOREHOLE NO:

OW-15 PAGE 1 OF 1DRILLING: STARTED **8/2/05** COMPLETED: **8/2/05**INSTALLATION: STARTED **8/2/05** COMPLETED: **8/2/05**DRILLING COMPANY: **Parratt-Wolff**

DRILLING EQUIPMENT:

DRILLING METHOD: **hollow stem auger**

SAMPLING EQUIPMENT:

NORTHING (ft):

LATITUDE:

GROUND ELEV (ft):

INITIAL DTW (ft): **N/A**STATIC DTW (ft): **N/A**WELL CASING DIAMETER (in): **4**LOGGED BY: **C. Yetman**

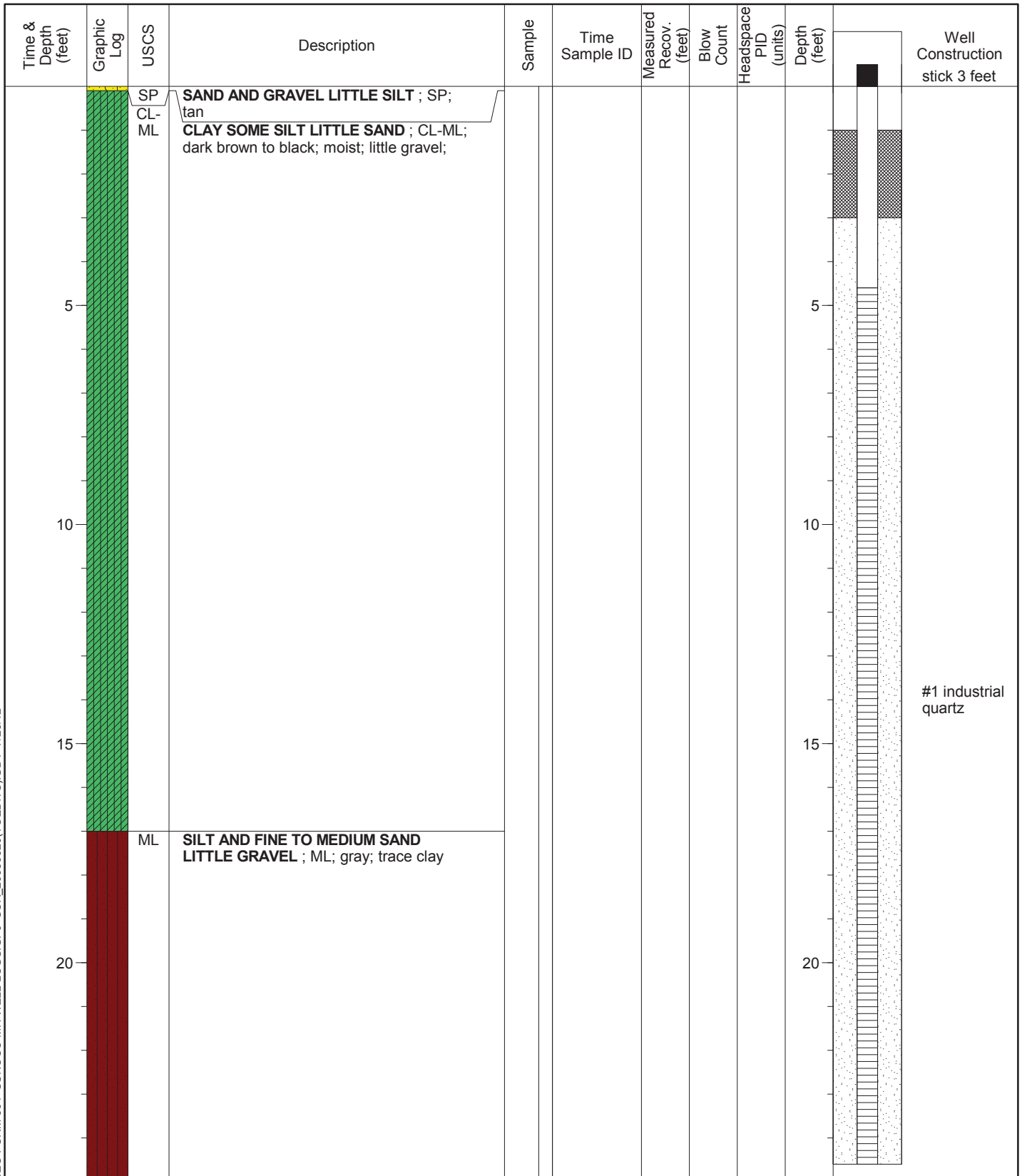
EASTING (ft):

LONGITUDE:

TOC ELEV (ft):

BOREHOLE DEPTH (ft): **25.0**WELL DEPTH (ft): **24.6**BOREHOLE DIAMETER (in): **8**

CHECKED BY:

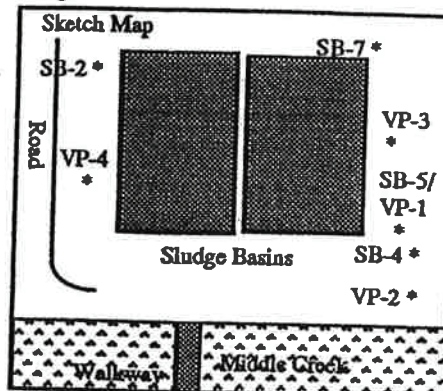


Hole terminated at 25 feet.

Groundwater & Environmental Services, Inc.

Drilling Log

Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC
 Location MIDDLE CREEK AREA Permit No. N/A
 Well number SB-5/ VP-1 Total Depth 12 FT Diameter 2 IN.
 Casing Elevation N/A Water Level: Initial 11 FT Static N/A
 Screen Dia. 2 IN. Length 9 FT. Slot Size 0.02 IN.
 Casing Dia. 2 IN. Length 3 FT Type SCH 40 PVC
 Drilling Method Hollow Stem Auger Sample Method SPLIT SPOON
 Completion Details FLUSH MOUNTED MANHOLE
 Driller B.L. MYERS BROS., INC. Log By E.S. Date 2 FEB 93



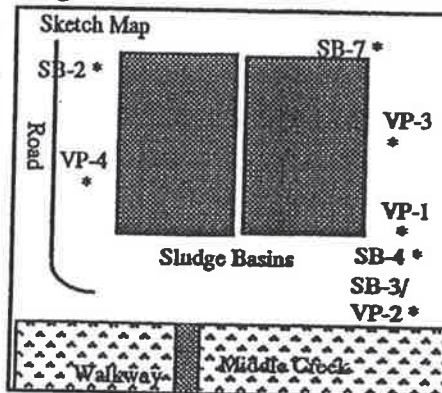
Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count	Lithology
					FILL
			336		Black silty sand with fill material/ subangular pebbles - dry, moderate odor
5	1		972	4-4-4-7	CLAY
	2		272	2-1-1-2	Black silty clay/ fill material, moist, strong odor
	3		1680	5-7-6-9	Black silty clay
10	4			4-4-5-7	Initial Water at 9 feet
	5		375	6-9-8-4	Dark gray clay
15	6			8-11-9-6	
17			0		
			0		
					BORING COMPLETED AT 17 FEET

AOI-5

Groundwater & Environmental Services, Inc.

Drilling Log

Project SUN: MARCUS HOOK REF. Owner SLIN COMPANY INC
 Location MIDDLE CREEK AREA Permit No. N/A
 Well number SB-3/VP-2 Total Depth 12 FT Diameter 7.625 IN.
 Casing Elevation N/A Water Level: Initial 7 FT. Static N/A
 Screen Dia. 2 IN. Length 9 FT. Slot Size 0.02 IN.
 Casing Dia. 2 IN. Length 3 FT Type SCH 40 PVC
 Drilling Method Hollow Stem Auger Sample Method SPLIT SPOON
 Completion Details FLUSH MOUNTED MANHOLE
 Driller B.L. MYERS BROS., INC. Log By B.S. Date 1 FEB 93

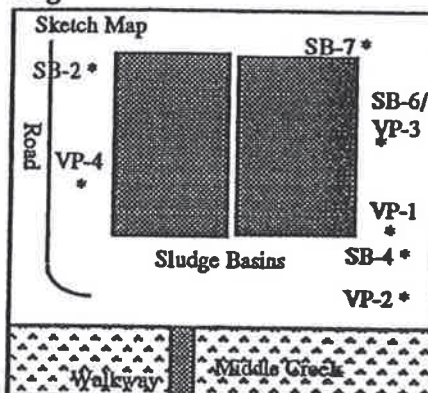


Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count	Lithology
			5		FILL Dark brown silty material with subangular pebbles, fill material
5	1		10	4-5-6-10	CLAY Tan silty clay with red brown NAPL, strong odor
	2			19-29-29-10	Initial Water at 7 Feet
	3		9	3-2-3-4	Dark gray silty clay
10					PEAT Brown peat, organic material
12					CLAY Dark brown / gray clay
					PEAT Brown peat, organic material
					CLAY Dark gray / brown clay
15			3		Dark black clay
					BORING COMPLETED AT 17 FEET

Groundwater & Environmental Services, Inc.

Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC.
 Location MIDDLE CREEK AREA Permit No. N/A
 Well number SB-6/ VP-3 Total Depth 12 FT Diameter 7.625 IN.
 Casing Elevation N/A Water Level: Initial 9 FT. Static N/A
 Screen Dia. 2 IN. Length 9 FT. Slot Size 0.02 IN.
 Casing Dia. 2 IN. Length 3 FT Type SCH 40 PVC
 Drilling Method Hollow Stem Auger Sample Method SPLIT SPOON
 Completion Details FLUSH MOUNTED MANHOLE
 Driller B.L. MYERS BROS., INC. Log By E.S. Date 2 FEB 93

Drilling Log

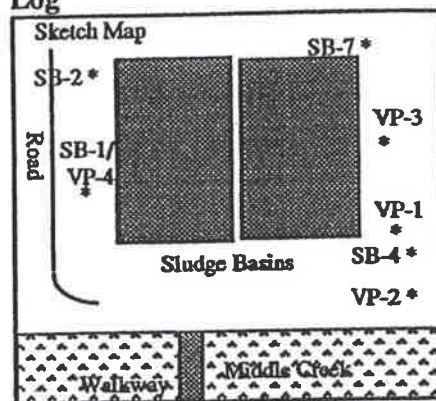


Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count	Lithology
					FILL Dark brown silty material with subangular pebbles, fill material
			0		CLAY Black silty clay - moist
5	1			6-4-2-1	
	2		7	3-3-6-9	Black silty clay / unconsolidated gravel - moist - strong odor
	3			8-8-11-12	Initial Water at 9 Feet
10	4			9-6-6-5	Tan / gray silty clay
	5			7-8-9-10	GRAVEL Dark unconsolidated gravel - odor noted
15					Unconsolidated gravel intermixed with silt and sand
					CLAY Dark gray clay
					BORING COMPLETED AT 17 FEET

Groundwater & Environmental Services, Inc.

Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC
 Location MIDDLE CREEK AREA Permit No. N/A
 Well number SB-1/VP-4 Total Depth 12 FT Diameter 7.625 FT.
 Casing Elevation N/A Water Level: Initial 10 FT Static N/A
 Screen Dia. 2 IN. Length 12 FT. Slot Size 0.02 IN.
 Casing Dia. 2 IN. Length 3 FT Type SCH 40 PVC
 Drilling Method Hollow Stem Auger Sample Method SPLIT SPOON
 Completion Details FLUSH MOUNTED MANHOLE
 Driller B.L. MYERS BROS., INC. Log By E.S. Date 1 FEB 93

Drilling Log



Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count	Lithology
5	1		18	15-13-10-8	FILL Brown silty sand with fill material, dry Dark gray silty sand with fill material, dry, petroleum odor
			12		
	2		31	12-8-10-0	SILT Black clayey silt, moist, odor
	3		93	32-24-14-8	
10					Initial Water at 10 Feet
	4			12-13-10-11	GRAVEL Poorly sorted gravel, saturated with red-brown NAPL
15			10		CLAY Brown silty clay with red-brown NAPL
					BORING COMPLETED AT 17 FEET